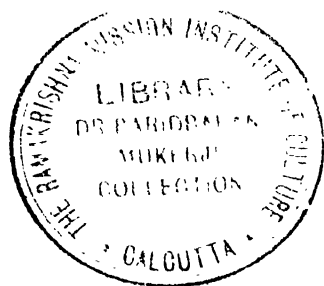


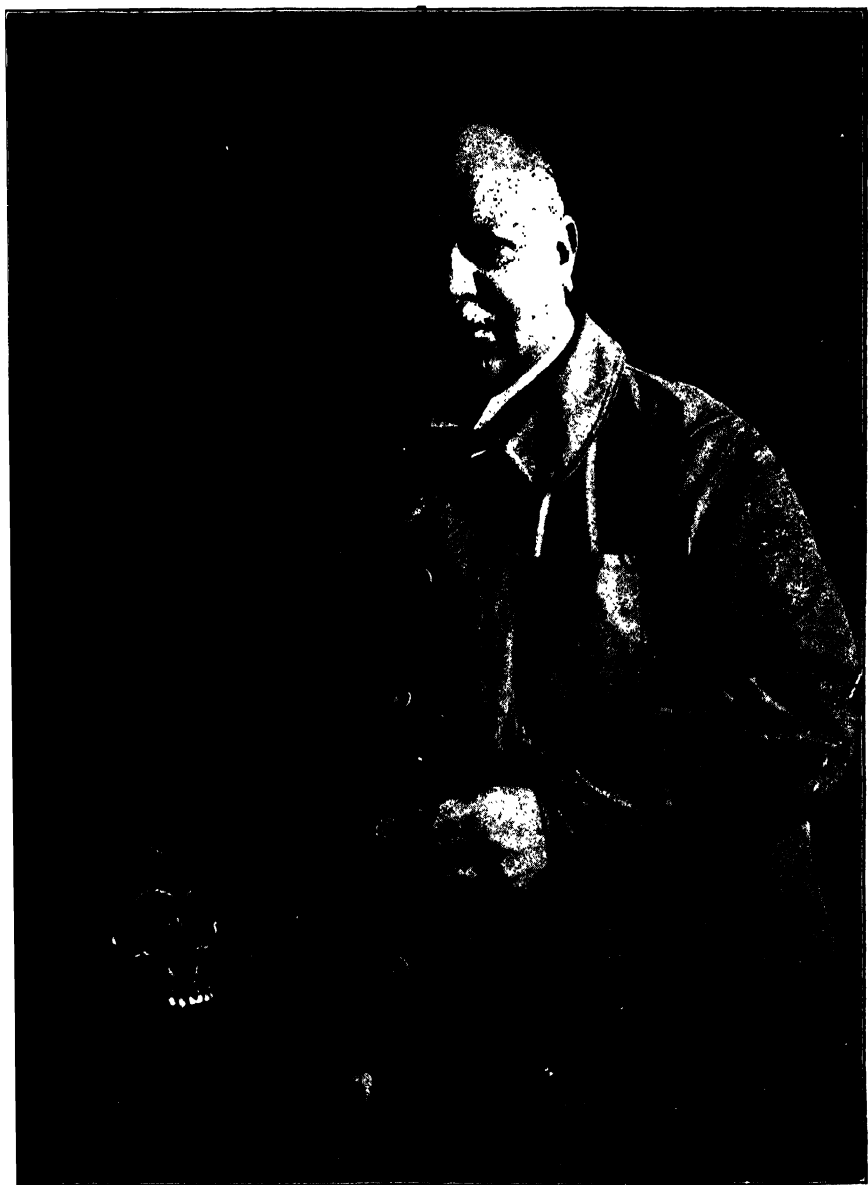
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HERMANN KLAATSCH.

THE EVOLUTION AND PROGRESS OF MANKIND

By PROFESSOR HERMANN KLAATSCH, M.D.

Edited and Enlarged by PROFESSOR ADOLF

HEILBORN, M.D. *Translated by* JOSEPH McCABE

ILLUSTRATED

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PREFACE

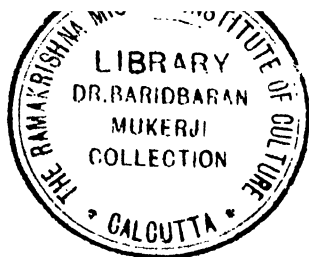
IN a short prefatory note Professor Heilborn relates how this work was prepared for publication in the very month in which the European War broke out. Klaatsch, whose great scientific attainments Dr. Heilborn describes in the Introduction, unhappily died in 1916, and the editing and completion of the work fell to Dr. Heilborn. From his intimate knowledge both of the Australian aboriginals, who are here much used for comparison with primitive man, and of prehistoric science, Dr. Heilborn was able to incorporate later discoveries and make the work more valuable than ever.

The second German edition reaches me as I write, and it will be found that every new find of importance has been included in this version. At a few points I have made further slight additions and modifications, so that the reader might have a complete manual of this very progressive branch of science. It has not seemed necessary in many cases to break up the text by specially marking the additions made by Dr. Heilborn. They are mere additions of fact, not expressions of opinion.

The work is intended for the general public. The high authority of Professor Klaatsch sufficiently recommends it in the narrower world of the expert, but the

plain language and elementary explanations make it of especial value to the very wide public which is interested in the fascinating story of man's development; and the ample and carefully selected illustrations should be peculiarly welcome. The biographical sketch in the Introduction has been slightly abbreviated, and many of the redundant illustrations omitted.

J. M.



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INTRODUCTION

IN Hermann Klaatsch, who died on January 5, 1916, at the early age of fifty-two, modern science lost one of its greatest hopes. His was the life of an untiring protagonist of truth and science; a man who was as hard as steel in the fight, yet bore under his armour the heart of a child, and even in his heaviest hours had ever on his lips the laugh of a care-free man. He had many open, and still more secret, enemies; for he was a pioneer in every branch of science he investigated, and his insistence on the discoveries he made—often great and startling discoveries—constantly raised opponents amongst the stubborn defenders of received opinions. At scientific congresses he was known and feared for his skill, his trenchant logic, his elegant and sarcastic diction, and his mastery of the subject. Yet this fighting spirit was not his innermost nature. This was seen rather in his uncalculating devotion to his friends and relatives.

Hermann August Ludwig Klaatsch, born on March 10, 1863, came of a family of distinguished Berlin physicians. One of his ancestors was physician to Frederic William III, and the most famous of his day at diagnosis. The eminent Berlin surgeon Robert Wilms, to whom a monument has been raised for his distinguished services as surgeon-general in the Austrian and Franco-German Wars, was his great-uncle. His father, a favourite pupil of Johannes Müller, had an extensive practice at Berlin.

At a very early age Klaatsch showed, as one would

expect from such a tradition, a decided predilection for scientific matters. In his seventh year he was enrolled in the list of "donors" at the Berlin Aquarium for bringing a good collection of amphibia and reptiles from the Hartz Mountains. At school he devoted himself to Darwinian problems, and he began his medical studies at Heidelberg under Gegenbaur, the friend and counsellor of Ernst Haeckel. At twenty he published his first work, an important study of comparative anatomy (*Zur Morphologie der Säugetierzitzen*). In the following year Waldeyer engaged him as his assistant at the Berlin Anatomical Institute.

As pupil of the greatest comparative anatomist and the most distinguished descriptive anatomist of modern times, Klaatsch thus received the finest conceivable education for special research. He came to see all things with his own clear eyes, not through the spectacles of others, to take no account of opposition, to be a pioneer in many paths, to follow every problem in its minutest details and test his views with the utmost severity; and the results he attained in every branch of modern anthropology give him an immortal place amongst the great names of science.

In October 1888 he went as assistant to Gegenbaur at Heidelberg, and in 1895 he was appointed associate professor of anatomy.

The conclusions he presented in his earliest works, especially in a very able study of the fins of the Crossopterygians (*Die Brustflosse der Crossopterygier*), in connection with the origin and development of the limbs of the terrestrial vertebrates, put him more or less in opposition to the Darwin-Huxley-Haeckel version of man's ancestry. He gave a more precise expression to these views at the Anthropological Congress at Lindau in 1899, where he had the same experience as Haeckel had had at Munich in 1877. "That isn't science—it's imagination," the elderly Ranke said; and Klaatsch,

on the safe ground of comparative anatomy, only shrugged his shoulders, when Ranke's clerical pupil, Bumiller, tried to refute him.

Klaatsch has often been reproached with "imagination." As if even exact science could dispense with what Goethe calls "exact sensory imagination!" Reason is, as Feuerbach said, of *bourgeois* origin, while imagination is of royal birth; and its royal children are the great builders, the discoverers of new lands in science.

In his speech at Lindau Klaatsch contended that man is "an independent branch of the Primates," the manlike apes being a parallel branch, but not in the line of man's ancestry. In one part of his organisation man has more than some of the apes, and in other parts more than others; so that none of the living types of Primates can be unreservedly regarded as his nearest relative. Man is in many respects closer to the lower forms of monkeys than to the anthropoid apes, and many of his features compel us to go back as far as the Lemurs, and on to a hypothetical primitive form, "the earliest stage of the Primates," which would not be far removed from the common stem of the primitive mammals. On the basis of our present knowledge of comparative anatomy, we must describe man as *a direct descendant of lower Primates*, and the Primates themselves as *primitive members of the mammal stem*, directly connected with it at its roots.

Since those days Klaatsch has accumulated such a mass of anatomical facts in support of his view of man's evolution, and collected such a wealth of illustrations on the subject, that even the inexpert can now form his own opinion on this "question of all questions," as Huxley called it. His theory is the backbone of the present volume.

In his speech at Lindau Klaatsch naturally touched upon the problem of man's antiquity, and in the same year he published his first essay on "the fossil remains of man and their significance in connection with his

origin." He was now to make this his special field of research.

In a glass case in the Provincial Museum at Bonn there were, almost forgotten, some remarkable human fossils: the skull-cap and a number of other bones of



FIG. 1.- THE REMAINS FOUND AT NEANDERTHAL.
(In the Bonn Museum.)

a prehistoric man, found at Dornap in the Neanderthal in 1856. The finder, Fuhlrott, had quite appreciated the importance of these bones in connection with the early story of man. One day, however, Rudolf Virchow had come to Bonn, and, after a thorough study of the

bones, the great pathologist had declared that they were "pathologically much altered": that there were traces of rickets and gout, and so the "Neanderthal man" could not possibly have belonged to a primitive savage race, "since so sorely tried a man could scarcely have lived to old age in a nomadic and hunting people." For the time this sealed the fate of the human fossils.

Klaatsch, indirectly stimulated by the distinguished anatomist Schwalbe, made a close study of the Neanderthal bones. He came to the conclusion that in the Neanderthal man we really had an early and backward human type, a "distinct species of the genus *Homo*," a primitive race differing from every living race. His theory, moreover, received valuable support, as he was able to prove that the distortion of the bones which Virchow had attributed to rickets, especially of the radius (in the lower part of the arm), was "an important zoological document," something which "antediluvial man shares with the anthropoid apes, the monkeys, the lemurs, and the climbing marsupials."

Fate willed that almost at the same time an important new discovery of bones of the Neanderthal type was made at Krapina, in northern Croatia. Klaatsch was one of the first to study these bones at Agram.

His idea of the primitive race took clearer shape, and he sought further evidence on every side. In the next few years he visited all the museums in Europe which had any remains of this earlier race, to test with his own eyes what others had said about them. He visited the places where discoveries had been made in Germany, Belgium, France, and England, in order to form his own opinion of the geological situation; for he had an extensive knowledge of geology also, and had lectured on it at Heidelberg. He included in his inquiries a study of the oldest embodiments of human culture, the flint implements. In 1902 and 1903 we find him in Belgium, digging for "coliths," the earliest types of

implement which the Belgian geologist Rutot had discovered, and which, being of Tertiary origin, had again raised a heated discussion amongst anthropologists and geologists of the question of "Tertiary man." Klaatsch was quite confident that he could prove the artificial working of the coliths he found in the sub-volcanic sands of Aurillac (in the south of France), and he never ceased to devote his attention to the question of coliths.¹

Huxley had, in his description of the Neanderthal skull (1862), pointed expressly to the problem of the Australians, and Klaatsch's studies now turned his thoughts in that direction. In February 1904 he started on a journey to Australia, where he was to stay more than three years, studying the aborigines at first hand and collecting a rich anthropological and ethnological material in connection with this "doomed race." The journey was subsidised by the Berlin Royal Academy of Science, and he collected an extraordinarily abundant and valuable amount of material, anatomical and ethnological. His collection, most of which is now in the Rautenstrauch-Joest Museum at Cologne and the small anthropological museum he founded at Breslau, is of the greatest scientific importance. His studies of the aborigines began in South Australia, and were continued in the north and west. They referred not only to bodily features, but he sought to learn something of the spiritual and psychic life of that remarkable race. How successful he was, we see from his various works (especially his *Todespsychologie der Uraustralier in ihrer Volks und religionsgeschichtlichen Bedeutung*, 1911) and from the present volume, in which he repeatedly, and rightly,

¹ The question is not yet settled. Benjamin Harrison collected in Kent even before Rutot in Belgium, and a large number of distinguished authorities now accept the coliths. Recently (1916) the German glacial geologist Werth came to the conclusion, after a thorough study, that Rutot's coliths must have been worked by the hand of man. Klaatsch thought the name "colith" inappropriate, and a source of "discredit."

draws parallels between primitive man and the living Australians.

In December 1905 Klaatsch was for some months in Java, chiefly to study the place, Trinil, where Dubois had found remains of the *Pithecanthropus* in 1891-2, and look for prehistoric implements or other remains. A serious illness from malaria, which lasted several months and laid the germ of his premature death, cut short his research in Java; and in the middle of May 1906 he returned, at the height of his fever, to the north of Western Australia.

Here he had to remain in hospital several weeks, but from his sick-bed he wrote triumphantly—and characteristically—to Berlin: “My stay in the hospital here has helped me to do things I had long sought in vain to do. . . . If I had not gone into hospital, I should probably have been handed over to the *morgue*.” At nights, left to himself in a badly lit room, he had to dissect with his fever-shaking hands in order to be able to give his valuable anatomical material to science. Scarcely recovered, and subject to new attacks of the disease, he vigorously resumed his studies of the aborigines in desolate north-west Australia—“quite one of the most God-forsaken places in the world,” he wrote home—and made his most valuable observations at Beagle Bay, Port Darwin, and Melville Island, where he made the acquaintance of Australians “in a quite savage condition.” “I am sorry that my time is over here,” he writes, before his start from Sydney; “I have not had enough of Australia and its sober charm. I want to come back.”

Before sailing for Europe, he spent a few weeks in Tasmania, in order to study the material relating to the extinct aborigines in Hobart Museum, and especially to dig for their primitive implements, which seemed to him of very great importance in connection with coliths. At Sydney he received his appointment as professor

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of anatomy, anthropology, and ethnology at Breslau. He accepted it gladly, feeling that it meant a wide and fruitful field of action.

He was back in the middle of April, and he flung himself with fiery zeal into the study of his rich Australian harvest. At various sittings of the Berlin Anthropological Society, the Anthropological Congress at Strassburg, etc., he gave a first account of the results of his journey,

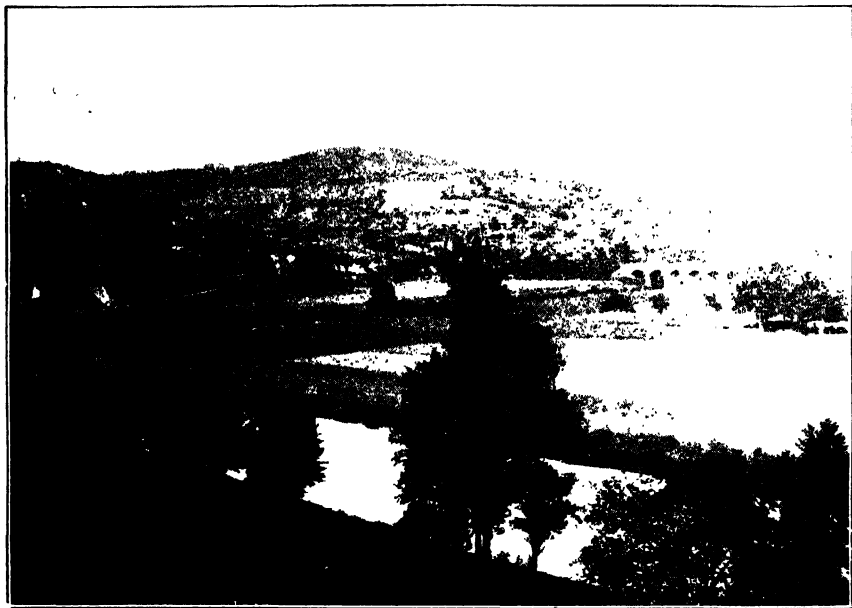


FIG. 2.—VIEW OF THE VÈZÈRE VALLEY. (HAUSER.)

and explained the chief problems to which it gave rise. But death snatched the pen from his hand before he could finish the great work he meditated. His manuscript is being considered by a number of experts, and it will be published shortly at the expense of the Berlin Academy of Science.

Work on this Australian volume, which contains most important facts and ideas in connection with the problem of man's origin, was interrupted by a new find :

the discovery by Schoetensack of an extremely ancient human jaw at Mauer (near Heidelberg) in 1907 and, especially, Hauser's discoveries of prehistoric skeletons in the Vézère valley. Here again Klaatsch opened up new avenues to anthropology by his studies. In drastic opposition to the older school, he stated emphatically what he meant by "anthropology": "The comparative anatomy of the human organism in its variations and its relationship to the other Primates, the apes and monkeys." He was constantly devising new methods of work, in order to lead anthropology out of the desert of sterile statistics in which all that was essential was in danger of perishing. Schoetensack adhered entirely to Klaatsch's ideas in his estimate of the jaw of "*Homo Heidelbergensis*," and Hauser at once appealed to him, as the leading expert, when he made his discoveries.

It happened that Klaatsch had already attempted an ideal reconstruction of the skull of the Neanderthal race, using the Bonn skull-cap, a lower jaw found at Spy, and a fragment of the upper jaw found at Krapina, and had exhibited this at the Anatomical Congress of 1908, saying: "Whenever a well-preserved skull of the Neanderthal race is discovered, it is sure to be like my reconstruction." He now heard from Hauser that he had, apparently, found such a specimen in an undisturbed stratum at Le Moustier in the Vézère valley. Klaatsch went from Frankfort, with a committee of distinguished anthropologists, to Hauser at Les Eyzies, and on August 12th he began the difficult task of digging out the first Neanderthal skeleton found in an undisturbed deposit, the "*Homo Mousteriensis* Hauseri." He then, with great labour and ability, put together the skull of the young Neanderthaler from the many fragments in his laboratory at Breslau, and soon afterwards he published in various organs his scientific analysis of the find, skilfully comparing the old and the new and opening up new perspectives.

Just a year later Hauser came across his second skeleton at Combe Capelle (Montferrand, in Périgord). From the nature of the case this ought to be quite different from the skeleton of the Acheulean man of Le Moustier. A telegram was at once sent to Klaatsch at Breslau, and he set off, just as he was, on his journey, which lasted two days almost continuously, to dig out the new find in the Dordogne. Hauser once laughingly



FIG. 3. — RECONSTRUCTED SKULL OF THE NEANDERTHAL RACE. (KLAATSCH.)

described Klaatsch's arrival to me, and the scene so well illustrates Klaatsch's ways that I will repeat it.

It was a morning in late September, four o'clock and still dark, when the train from Paris reached the little station of Périgeux. Klaatsch had telegraphed that he was coming. The train stopped, but no one got out. Hauser ran the length of the train, but he could find no trace of his guest. Yet Klaatsch *must* be in it somewhere. The station-master was consulted,

and the carriages were searched with lanterns. Klaatsch had made himself fairly comfortable in one of them, and was fast asleep. The moment he was awakened, he greeted Hauser, seized his bag and his very characteristic stick, which always accompanied him, and cried out: "Now for Combe Capelle!" As a matter of fact, the two of them almost at once set out on the fifty-mile journey in a car. Klaatsch insisted on seeing the find before he would take the rest he so much needed.

The "*Homo Aurignacensis Hauseri*" of Combe Capelle proved to be, as Hauser had supposed, a member of a species differing considerably from the Neanderthal race. Klaatsch was able, after careful anatomical comparison, to describe him as a representative of a second prehistoric race, much nearer to the modern European than to the Neanderthal race, and one that everywhere displaced or absorbed the older race.

From the ever-growing and deepening study of these two primitive races the untiring worker now had to face a new and formidable problem: that of the real home of these very different representatives of primitive humanity, and, beyond that, but closely connected with it, the problem of the relations of the various anthropoid apes to the different races of men. According to Klaatsch, the changes of the animal population during the Ice Age enable us to form an opinion as to the origin of the two races. Amongst the fauna of the Neanderthal world are the ancient elephant and other animals allied to those of modern Africa; the fauna of the Aurignac man's world comprised the mammoth and an animal population from Asia. Therefore, Klaatsch concluded, Aurignac man came to Europe from Asia, Neanderthal man from Africa. Then came the most surprising point. He succeeded, by means of new and exact methods of research and comparison, in showing very remarkable anatomical parallels in the structure of the skeleton between Neanderthal man and the gorilla on one side,

and the Aurignac race and the orang on the other. From this he deduced a very early division of the primitive group of the higher Primates—the “Propithecantropi” (earlier ape-men), as he called them—into, at first, at least two great branches, a western and an eastern, “and each of these divided into races of men and anthropoid apes”; leaving open the question whether “other varieties of the human race might not stand in the same relation to the chimpanzee and gibbon of to-day as the



FIG. 4. SKULL FOUND AT LE MOUSTIER.
(HOMO MOUSTERIENSIS HAUSERI.)

Neanderthal race did to the gorilla and the Aurignac race to the orang.”

Klaatsch himself in this respect emphasised “the very plain analogies of the Heidelberg jaw to the features of the gibbon”: a point to which his attention had been drawn by certain studies of the zoologist F. Melechers, which had been inspired by Klaatsch’s work. As to the affinities of the chimpanzee, even the very cautious Schwalbe, speaking of the prehistoric human jaw found

at Ehringsdorf (Weimar) in May 1914, says: "The Weimar jaw is certainly of the lowest type, and is nearer to that of the anthropoid apes (the chimpanzee) than to the other known lower jaws of *Homo primigenius*," (as Schwalbe calls the Neanderthal race).

It will easily be imagined that anthropologists were much excited by this departure from the accepted view, as Klaatsch postulated a *plural origin* (polygenesis) of the race and a common basis for man and the anthropoid apes, when he put his conclusions before them at the Cologne Congress in August 1910. There were jokes about his supposed "conversion from monogenetic Saul to polygenetic Paul." But Klaatsch had blunted the point of these darts in advance by saying: "The man who would form his own judgment on these matters will find it necessary to make a thorough study of the skeletons of man and the anthropoid apes. It is no use just making sceptical remarks on the subject."

He did not allow himself to be distracted by these attacks, to which he was accustomed, but quietly and conscientiously went on with his work. The next step was the proof of his views as to the relations of men and the anthropoid apes in respect of certain features of the brain. He put this before the Anthropological Congress at Heilbronn in 1911, in a speech on "The genetic significance of the contour of the human cortex." Unfortunately, he never completed these very important studies. When we last met in the autumn of 1914 he spoke to me of "quite new and astonishing results" on the subject, and we may hope that he has left behind something for publication. The same may be said of his work, already published in part, on the structure of the mouth and lips and the significance of the mammary mechanism in connection with man's ancestry.

In his later years Klaatsch was—apart from purely anatomical research, which was always for the purpose of solving the problem of man's origin—more and more

occupied with questions about the general culture of prehistoric man. There are good reasons in the character of the subject for putting this material in a popular form, as Klaatsch did, but the main reason is that he was especially gifted for the popularisation of science. He had given proof of such gifts in his seventeenth year, when he founded a scientific society amongst his fellow pupils, and gave them lectures on zoology, biology and astronomy. The lectures to school-children which he gave at Mannheim (collected in his first popular work, *Grundzüge der Lehre Darwin's*, 1901), showed this still more clearly, and his success at scientific congresses was largely due to his gifts in this direction. Men with these gifts are always good teachers. Klaatsch undoubtedly was, but he was always anxious to go beyond his pupils and communicate his stores of knowledge to the general public. He was ever ready to sacrifice his scanty leisure in the cause of general education. His public lectures at Breslau were highly esteemed and looked forward to by all who wanted light and knowledge on the mystic problem of existence instead of vague and obscure philosophising.

In regard to the relations of science and religion he says, at the close of his *Entstehung und Entwicklung des Menschengeschlechts*: "The knowledge that man has a common natural origin with the rest of the living world can do no more harm to religion than the rotation of the earth on its axis. When this fact is so generally known that even a child at school will not be excused for not knowing it, the consciousness that our race has been evolved, under the rule of law, from a lower condition will prove a valuable possession. . . A religion that fears the truth must be in a bad way." And he shows his high conception of the mission of a thinker in the words: "If God is the substance of truth, all investigation of the truth is a service of God. We men of science would be guilty of sin if we did not share the results of our work with our fellow men."

In the present work, which is a sort of summary of the results of all his inquiries, a retrospect and an outlook, the above words are the dominant note, harmonising and pervading the whole. His life, rich in accomplishments and still richer in hopes, was ended prematurely for science. But, as the anatomist Wegner so warmly said, "if we found ourselves confronting so many shattered hopes when we laid him to rest in sight of the ancient Wartburg, we could at least, like the sun, whose rays burst victoriously through the winter clouds on that day, enjoy, guard, and augment the golden heritage he left us." When, on March 10, 1916, I had to give a memorial address before many hundreds of deeply moved hearers in the Scientific Central Union at Berlin, his friend and colleague at Breslau, Professor Coenen, sent this last greeting and appreciation:

"From the gray caverns of prehistoric Europe thy spirit of inquiry led thee to the farthest ends of the earth; and in the Australian desert and the quiet study thou didst raise the royal structure of thy teaching on man's origin, its bases the great Ice Age. What thou didst create in the eyes of an astonished world is worthy of thy country, thy fathers, and thyself. German science, all science, mourns thee."

ADOLF HEILBORN.

THE PROGRESS OF MANKIND

CHAPTER I

MAN'S PLACE IN NATURE

THE extension of the idea of evolution to the human race was an inevitable logical sequel to our knowledge of the origin of all living things. The conception of man as a member of the living world, a branch of the animal kingdom, is now the scientific foundation of all study of body and mind. No attempt to give man a special position as a "created" being, differing in origin from the other organisms on this planet, can be sustained before the tribunal of science. Such attempts as are made are due, as a rule, to ignorance of the subject or prepossession. If the word "creature" is to be used at all, it can be used only as a figurative description of the origin of the entire organic world, including man, from some source that is at present unknown to us. To detach man from other living things is quite unjustifiable. It is not our task here to discuss the great ultimate problems of the origin of life and the growth of the animal world. So far from entertaining any illusion of being able to solve those ultimate riddles of the universe, we recognise the strict limits of our power of attaining knowledge, and we take man as a given fact amidst the animal world that is known to us.

Within this clearly defined province, however, there is no limit to scientific inquiry. Without regard to the unjustifiable inferences that may be drawn from his work,

the anatomist and physiologist has the purely matter-of-fact task of dissecting the organism which we call "man" by the same critical methods, and investigating his life processes from the same point of view, as we use in the case of any other animal.

What is common to man and other animals reveals to us the method of the evolution, not merely of humanity, but of the predecessors of humanity, far back into the earliest history of our planet. What our comparative investigation shows to be proper and peculiar to man instructs us as to the special lines of evolution in the various branches of humanity which have raised our race to the mastery of the earth.

The rise of the human race above all other beings, through man's ability to control the forces of nature, has invested the higher nations with a sort of supernatural halo, and this, at first sight, makes it difficult to believe that the "lord of the earth" can have evolved from a lowly animal level. But we have only to survey the race itself, as it is scattered over the earth, to see at once such a great variety of stages of culture that the apparent gulf between the lowest men and the closely related anthropoid apes becomes very much narrower. On the other hand, the distance of the men who are nearest to "nature"—the aboriginals of Australia, for instance—from the civilised nations of Europe is very considerable in point of culture, but not in regard to natural constitution. Where there are bodily differences, moreover, the advantage is by no means always on the side of civilised man. On the contrary, the advance of civilisation is often purchased by no slight sacrifice of physical capacities.

If we want to define "civilisation" precisely, we may take the word to mean all the auxiliaries of our life; not merely such as make it possible, but those which help to diminish the struggle with our natural environment and do not simply belong to the body itself. The

simple boomerang of the savage and our fire-arms, a boat made of ox-hides and our ocean liners, a roof made of wattle and our modern houses, the primitive ornamentation of the savage and our tailor-made clothing—all these things are but so many phases of the one process of the evolution of civilisation. The idea of “man” remains when it has been stripped of all non-corporeal auxiliaries.

On the other hand, we find in the animal world habits and devices which “artificially” lessen the struggle for life just as our civilised methods do, and sometimes to a quite astonishing extent. The homes and communities of insects, the storing of food underground by mammals, the nests of certain birds, etc., come, when we regard them objectively, under the same heading as the devices of man, however much we may dispute about the relative degree of intelligence involved in them. The wish to separate the idea of “man” as far as possible from that of the “animal,” has led to the adoption of two different names for the respective mental faculties, the animal being credited with “instinct,” while man alone is supposed to possess “intellect.”

These are mere words to express the fact that the capacity for artificial action is “implanted” in the animal, and that in the case of man alone is there a free expression of the will and a complete understanding of the significance of his achievements. The simple reflection that there has been a gradual development in both cases, and that it is impossible to draw a sharp distinction between the two ideas, shows at once that this attempt at separation is unfortunate and fruitless. No close observer of animals will be able to deny them a certain degree of intelligence, reflection, and choice of means in their actions. On the other hand, even in the “normal” man there is often so much failure to use the capacity of the brain adequately that a comparison with the animal in that respect would not be very flattering to

the human being. If the social support were not so highly developed in the case of man, especially of civilised man, perhaps the true measure of our actual capacities would be a sorry spectacle. The human child often behaves in its earlier years with a lack of intelligence that one would not find in the case of a lower mamma' at the same stage of development. The latter has an instinct—a capacity firmly assured through heredity—to recognise danger and avoid injury. That the human child does not need this is due to the extraordinary development of the period of nurture in the case of man. Properly considered, instinct is in no sense subordinate to what is called intellect; indeed, this capacity for certain rational modes of action, which has been secured for generations through habit, indicates a high stage of evolution. We find the same thing in the case of man in certain artistic and scientific respects. We speak, it is true, of natural endowment and genius, but instinct would be the better word to use.

The blessings of civilisation, of which the higher nations are so proud, have deprived, not merely the body, but even the mind, of certain capacities which actually give the "savage" a certain superiority to us. He can maintain life in very difficult external circumstances. He can get food and drink in the desert, make fire by rubbing sticks together, face the sun or a raw climate without clothing. He can, in a word, live in conditions in which the proud European would cut a very poor figure, and would soon succumb.

Man is, in the strictly scientific sense, an upright vertebrate whose hind limbs end in a supporting mechanism, the foot, which we find nowhere else in the animal world. All our other bodily features, considered separately have their parallels in other animal forms; it is only the combination of them that is peculiar to man. It is true that the animals have not, in their adult condition, the same pronounced doming of the skull owing to the

growth of the cerebrum ; at least, animals comparable to man in size have not got it. Many of the smaller American monkeys, however, have, relatively speaking, as large a volume of brain as man. In the case of the man-like apes we find, when they are young, large heads and finely domed skulls which differ little from the human condition.

Man's face has no single feature that is not found in the animal world. The forward-looking eyes are a common possession of man with all the Primates—the apes and monkeys. Linné, who invented the word “Primates” and put man and the apes in one order, included also the lemurs, animals whose eyes are not entirely directed in front, but look a little obliquely, and which in other respects show some affinity with man, yet in others are nearer to the oldest and “lowest” forms at the very root of the genealogical tree of the mammals.

The human nose, which is so prominent in Europeans, may seem to be a special feature, but that is not the case with human beings generally. Amongst the lower races we find much flatter noses, and these are transitional forms in the direction of the ape-nose. Amongst the apes, moreover, particularly in the case of the long-nosed ape, we find organs which make even the European nose seem small.

The human mouth is distinguished by being lined with a delicate mucous membrane—red in the case of Europeans, but darker in the case of darker races—which was long considered a special feature of man. We now know, however, that the anthropoid apes have the same feature, and that there is a corresponding structure in the other mammals. The slighter prominence of the human mouth-parts, as compared with most of the mammals, varies a good deal within the human family, the pronounced prognathism we find amongst lower races, such as the African and Australian blacks,

inviting comparison with an animal's jaws. This is the more noteworthy as there really is a considerable difference between man and the animal in regard to the teeth, and it is only on careful inquiry that the supposed



FIG. 5.—THE LONG-NOSED APE.

uniqueness disappears. Man's teeth have a remarkable harmony, a regular distribution in a continuous series, and no other living animal shares this feature. In this "fence of the teeth," as Homer calls it, the various types succeed each other very regularly. It is particularly

noticeable that the canine teeth (or "eye-teeth"), though well developed, are not larger than the other teeth. Even amongst the lower races they never approach the canine teeth of carnivores and of many monkeys.

The external muscular shell of the ear has no special features in man. We find it in the same forms amongst the monkeys. The hair on the head is found in the same form in the case of young anthropoid apes. Men's beards, apart from the artificial length to which they have been cultivated, are paralleled amongst the monkeys, which sometimes have conspicuous beards. Side-whiskers are fairly common amongst the monkeys; and other animals—the goat, for instance—have beards on the chin.

The general hairlessness, or apparent hairlessness, of the human body, seems at first sight to be a special feature of man. When we examine closely, however, we find hair all over the trunk and limbs, at all ages and in all races, even the Mongolians, whose skin seems to be particularly poor in hair. There are, on the other hand, some very hairy specimens of humanity. A large number of such individuals can be found amongst male Europeans and amongst the Australian aborigines. The Aino—the relics of the primitive population of Japan—are still more notable in this respect. Thus there is a good deal of variety in regard to hairiness within the human family; sometimes, in fact, the human being has a great quantity of hair in parts where the apes have none. The persistence of the earlier animal coat of hair or fur is seen clearly in the thick coat of woolly hair (lanugo) on the new-born baby. Men are much more hairy than many other mammals, especially those that live in water. The pachydermatous animals of the tropics also show a great degeneration of the hair: to say nothing of the walruses and whales, which have scarcely got any hair left.

The development of certain cutaneous (skin) glands on the breast into milk glands is another conspicuous

feature. It is the possession of these which puts man in the class "Mammals." Hence the story of the predecessors of humanity is in its earlier period part of the general story of the mammals. There is no structure of the kind amongst the other vertebrates. The lowest living land vertebrates, the Amphibia, are very richly provided with glands in the skin, but these are almost entirely

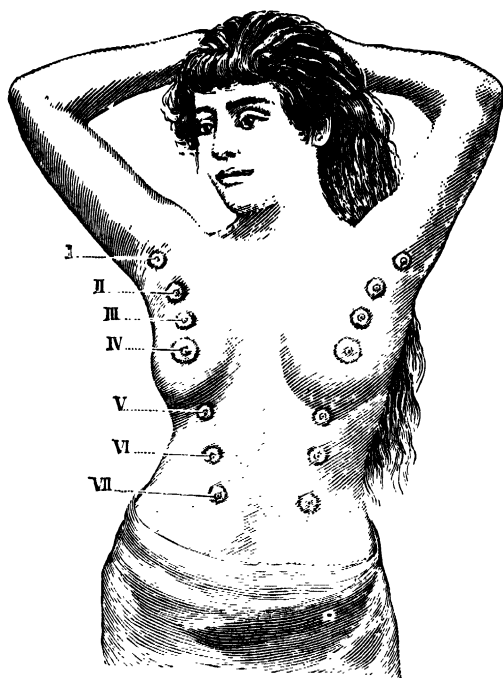


FIG. 6.—THE POSITION OF SUPERNUMERARY BREASTS (KLAATSCH.)

wanting in the case of the reptiles and birds. It is the mammals that renew the connection with the primitive condition. The sweat glands and the sebaceous (fat) glands associated with the hairs have a very important function in connection with the heating mechanism and metabolism in the case of man and the other mammals. But it is the special development of them as milk glands on the breast that enables the mammal mother to make

perfect provision for her young, and is the basis of that link between mother and child which, in the human case, has evolved into the finest flower of emotional life. The special feature of these "mammary" organs, to use the scientific term (from *mamma*=the breast), in the human case is the enlargement of the part round the gland by the development of cushions of fat in the woman. We thus get the large breast (bosom) as a sexual ornament, found nowhere else in the animal world.

Other features, such as the restriction of the glands to the breast, are common to man and the apes. Frequent cases of abnormality of the teats, which are sometimes

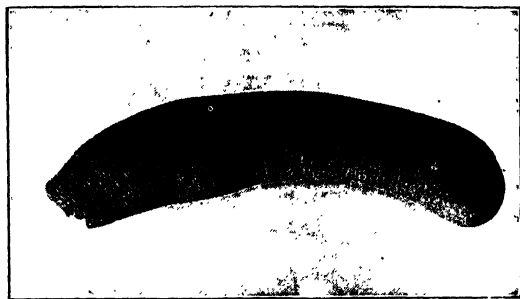


FIG. 7.—A HUMAN TAIL.—NATURAL SIZE.
(SARASIN.)

multiplied down the whole line of the breast reveal the close relationship of man to the lower types of mammals. The occurrence of the same structures in the *male*—to whom they have been transferred by heredity—is a feature that man shares with the other mammals.

There is nothing peculiar in the general form of man's trunk and limbs. The general public are often deceived by the lack of a tail, and think this a special feature of man. Nothing could be further from the truth. As a matter of fact, every man has a prolongation of the vertebral column which corresponds to the animal's tail. In the human embryo this sticks out quite a considerable distance. It degenerates afterwards, but it still includes

four or five vertebrae, and passes into a condition that might be compared with the shortened tail of a dog. It bends forward between the legs, and ceases to be outwardly visible.

The human coccyx (as this lowest part of the spinal column is called) is generally made up of five degenerate vertebrae in man and four in woman. As in the Asiatic apes it consists of only *three* vertebrae, it follows that man has really a longer (permanent) tail than the orang! Children are occasionally born with tails, and these sometimes have nerves, blood-vessels, and muscle—in some cases even cartilage or bone. This type of human tail is, however, scarce, and is generally short—about an inch long. “Soft tails” are more frequently found, and they run to a length of ten inches or more. In a case observed by R. G. Harrison (1900) the soft tail was nearly two inches long at birth, and it continued to grow. It was more than three inches long after six months, and it was then removed at the request of the parents. Sometimes the soft tail is covered with hair and is (as in the case observed by Harrison) movable and sensitive. The same phenomenon occurs amongst the man-like apes and certain tailless monkeys (such as the *Inuus ecaudatus*). Recently (1914) Dr. Paul Sarasin described a soft tail, two and a half inches long, which he found on a little Tamil girl at Tranquebar (Madras).

Whether these structures can be inherited is a question that has not yet been properly studied, but the stories of “tailed races” left us by older authors are generally due to errors of observation. A good many native races, such as the Niam Niam and the Bongo of Central Africa, decorate themselves with “artificial tails,” either of bark or real tails cut off animals. Possibly Marco Polo’s report of a tailed race in Sumatra may be explained in this way. On the other hand, tails passing from one generation to another are particularly apt to appear

amongst the peoples of southern Asia. Elwood tells that the head of the ruling family in the city of Purbunde had the title "the tailed Rana"; the tail having occurred



FIG. 8.- A TAMIL CHILD WITH A TAIL.
(SARASIN.)

so frequently amongst his ancestors that it was a clear proof of his descent from the sacred *hanuman* monkey (*Semnopithecus entellus*). In embryos there is often a

tuft of hair—a sort of hairy tail—at the spot where the point of the coccyx presses against the skin behind, before it is bent in.

Man and the anthropoid apes are not the only mammals to have suffered a degeneration of the tail. The mole and the marsupial “bear” have it in a very degenerate form. Frogs have the honour of being often drawn by humorous artists in human form because of their lack of tails; and the relative proportions of their trunk and limbs lend themselves to the purpose. These proportions in the frog are strikingly similar to those of man, and there is, on the whole, a similar arrangement of the muscles, so that the animal is most useful to physiologists to illustrate the muscles of the human anatomy. But these apparently striking facts lose their significance when we learn that the proportions of the arms and legs in man are not peculiar to him. They connect him with the lowest vertebrates, his remote ancestors. What is really striking in the case of man as compared with the other higher animals is that *he* has retained the primitive features whilst *they* have generally lost them.

The possession of two pairs of limbs is common to man and all the land vertebrates. Even in the fundamental structure of the limbs, the agreements and differences between fore and hind limbs are, on the whole, the same in man as in the other land vertebrates. Hence *the earliest phases of man's history are part of the general story of the rise of the terrestrial vertebrates*. The members of this ancient group, which contained the germs of the amphibia, reptiles, and mammals, are not, of course, credited with the power of specialising their descendants, but all the higher animals have evolved from them. We have no fossil remains of the group, but we have certain imprints which they made in wet sand as they walked.

Even if we were to find such fossil remains, as is quite possible, we should not learn much that is new from

them in regard to man's early history. We should be in a position to say that human forms could be evolved from those forms, but we should not find anything specifically human about the remains. The point is very important in connection with the earlier history of man. It is quite clear that it is not until the time when our ancestors began to develop processes which led to phenomena that are found in *man alone* that we shall find any specifically human character in the bones.

It is simply a logical consequence that from this point of view the human story proper begins with the special development of the foot. When we look back on the story of the past, we can say definitely that the relevant changes in the common ancestor of man and the other Primates probably took place during the Tertiary Period, the third great division of the story of the earth. Going still further back, we come to the Secondary Period, in which the giant reptiles dominated the earth; and then to the Primary Period, in which (or at the close of which) we may place the division of the great stem of the primitive land vertebrates into reptiles and mammals. The two groups agree in the general plan of their structure, but they have many differences. The common ancestral group, which we call the "sauro-mammals" (reptile-mammals), must have been in existence in Primary times. We need only refer here to a group of animals known as the *Stegocephala*, which are clearly close to the common root of the reptiles and mammals.

Further back we have the problem of the origin of the land vertebrates as a whole: a question which we only answer briefly here, in so far as it is necessary for a proper understanding of the human organism. The problem of the first appearance of life on our planet we will omit entirely. These are questions which at present we cannot answer, and they therefore do not come within

the range of the exact sciences. There are, however, certain unassailable deductions from the known facts which leave no room for doubt that our earth was at first a fiery sphere and therefore uninhabited, and that then, as the solid and fluid constituents of the globe were sorted out, life appeared in the primitive seas, which differed considerably from the seas of our own time. All the living things of to-day point to the sea as their common mother. We see that clearly in the case of the inverte-

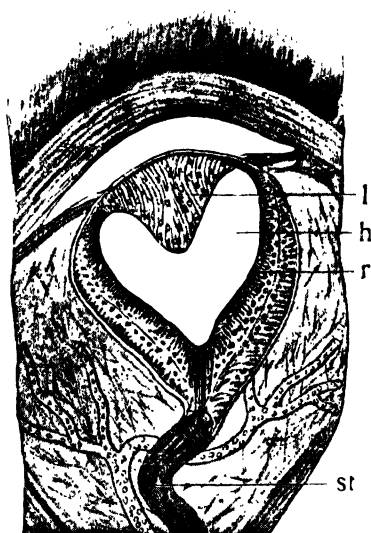


FIG. 9.—THE PINEAL EYE OF SPINENODON.

brate animals; and the fishes remind us that the vertebrates are not an exception.

There is still in the sea in many parts of the earth a small organism that approaches the early condition of the ancestors of the vertebrates. It shows us, in classic simplicity, the ground-plan of the vertebrate organisation. This is the venerable *Amphioxus*, which has played a unique part in science. The small, lance-shaped, double-pointed (hence called *amphioxus*) body has no vertebrae. The single support of its frame is

a chord (*chorda*) that runs the length of the body, and is the basis of the nervous system. The chord consists of very flexible, elastic tissue, such as we find in the tentacles of many of the lower invertebrates, and also in certain corresponding structures round the mouth of the Amphioxus. Hence the "vertebrates" are now called the "Chordates" (*chorda*-animals); as even many of the fishes, in spite of their otherwise advanced organisation, have no vertebrae.

The vertebrae are supporting structures, partly of



FIG. 10.—THE MOST PRIMITIVE REPTILE, SPHENODON.

cartilage and partly of bone, which develop round the primitive chorda—a process we can still observe in the human embryo, when it has developed from the ovum into a small cluster of cells. The relation, moreover, of the chorda to the nervous system, which spreads over the back surface, remains the same. Hence our spinal narrow is enclosed in a canal inside the backbone, and at the anterior end this enlarges into the skull, the case or the central organ of the nervous system, the brain.

In the latter we still have relics of ancient sense-organs which point back to our earliest pre-vertebrate history. Such is, for instance, in the vertex of the head the relic of an eye which was once fully developed in the vertebrate world, as it still is in many reptiles (certain lizards, for instance).

On the ventral surface the alimentary canal develops. In the earliest ancestral forms this also served the purpose of breathing : that is to say, it has structures for extracting oxygen from the surrounding medium and passing it on to the blood-vessels, which distribute it throughout

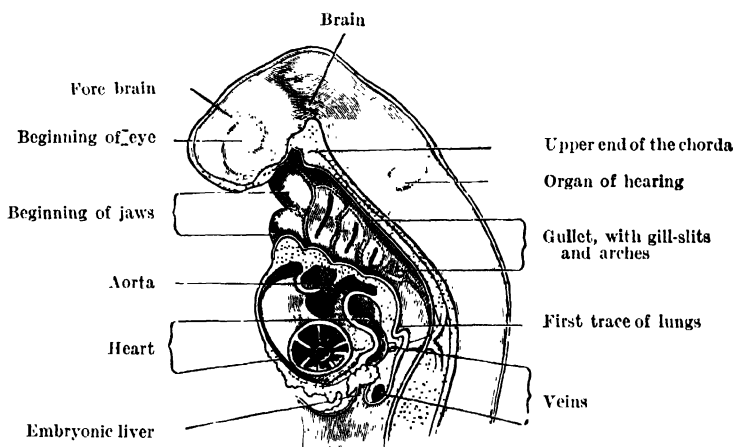


FIG. 11.—HEAD OF HUMAN EMBRYO. (HIS.)

the body. The part of the body which goes first in locomotion—the brain end—bears these respiratory organs, which are fastened to certain cartilaginous arches round the alimentary canal—the gill-arches.

The fact that the human embryo has these gill-arches, like the embryo of every terrestrial vertebrate, is proof enough in itself that our ancestors lived for ages in water. It is, however, not expedient to speak of a “fish stage” in our ancestry, as this makes one think of the actual fishes. The fishes of to-day are the descendants of long extinct forms, and they do not give us a

correct idea of the early inhabitants of the seas which are to be regarded as the ancestors of the mammals. Still, science can learn a good deal about the earlier condition of our organs in the marine stage by a careful study of our modern fishes, especially the sharks, which have remained very primitive in their structure.

We thus learn that, when the change was made to air-breathing on land, the gill-structures did not decay, but developed into some of the most important parts of our head and neck. Of the slits which opened outward from the alimentary canal through the gill-arches, the *gill-slits*, which served for the escape of the water that flowed through, one—the first—has been preserved in us. It is now the Eustachian tube, a passage from the throat to the organ of hearing—to the tympanic cavity, which was originally on the surface of the body. Enclosed by a thin membrane, the tympanic membrane, it is now part of the apparatus for conducting sound to the internal ear, and the three little bones which are concerned in the same function are merely parts of the earlier gill-arches. Their smallness must not be taken as a measure of their importance. One of them, the “hammer,” which is fastened to the tympanic membrane, was originally a part of the first gill-arch, and in the embryo it is connected with the lower jaw by a strong piece of cartilage. The other two, the “anvil” and “stirrup,” are parts of the second gill-arch, the lower sections of which are partly found as a peculiar-shaped process on the lower surface of the skull, and in part they, combined with the remains of the third arch, form the hyoid bone, the “horns” of which clearly show the earlier arch-structure. Of the seven gill-arches the fourth and fifth are incorporated in the cartilage of the larynx (“Adam’s apple”). The sixth forms a cover over the glottis, which lies between the arytenoid cartilages. These belong to the seventh gill-arch, which has assumed

considerable importance in connection with the function of the lungs.

The origin of the lungs themselves has not yet been satisfactorily explained. Their position in relation to the anterior part of the alimentary canal makes it probable that they were evolved from gill-pouches at the time of transition to the land ; they develop from the alimentary canal in the embryo as processes of the gill-slits. This enables us to understand their relation to the last gill-arch, the foremost part of which is a supporting apparatus for the entrance to the lungs : the trachea (windpipe), which has been formed by a union of the foremost parts of the air-sacs. This is the case also with the cricoid cartilage, which is the basis of the arytenoid, and with all the little rings of cartilage which make up the framework of the trachea or bronchial tubes. The first gill-arch has had a particularly important development, as it has become the arch of the jaws. It has passed completely out of the service of the respiratory system into that of the alimentary system, as it was well fitted to do on account of its position at the beginning of the alimentary canal. At first a closed ring, the arch has divided into an upper and lower section, and these open and shut so as to keep in the food that has been taken. This is the origin of the apparatus we call our upper and lower jaws. The former arch-character is still recognisable in the lower jaw, but the upper jaw is now so firmly attached to the skull that its proper limits are not seen without close study.

The mandibular (jaw) arch became effective for its new function by association with a quite different instrument. This was the teeth, which we do not find in the lowest vertebrates or chordates. As we find them firmly fitted into the jaw at higher stages, they seem to be so well placed for their purpose that it must seem strange to say that originally they had nothing to do with it. Yet we can easily prove in the case of the shark that



FIG. 12.—A SHARK'S TEETH (ODONTASPIS).

the teeth were at first merely *scales*, originally distributed over the whole of the skin. They form the armour-plating of the shark, the "shagreen" which makes its skin so useful for polishing. If you pass your hand over the skin from the tail-end toward the head, you feel the resistance of innumerable little spikes. These are the prickly scales, or cutaneous (skin) teeth; and the name is not inappropriate, as they consist of two materials which are otherwise found only in the real teeth in the mouth. They are formed of an external very hard layer, the "enamel," and an internal mass of "dentin." The cone-shaped body of the tooth encloses a cavity provided with blood-vessels, the pulp-cavity. From this a number of fine canals, with many branches, extend into the substance of the tooth. These two constituents of the teeth always develop in the same way; the enamel comes from the surface-layer of the body, the epidermis, and the dentin from the cells of the lower stratum of the skin. These cells also produce the plates which form the real prickle of the teeth.

These organs are very important in all the vertebrates. The bony skeleton has been developed from these little teeth in the skin. The tiny cells which produce the hard substance spread over the internal skeleton, which was originally made of cartilage, and manufactured bone, which is so much harder than cartilage, throughout the body. Bone consists of phosphoric acid, and, in smaller proportion, of carbonate of lime, fluorine, and magnesia: constituents which are found in solution in *sea-water*. It is another reminiscence of the marine stage in our ancestry. The blood of land vertebrates is another indication of this, as it is a thin solution of chloride of sodium (common salt). In cases of serious loss of blood, the loss may be replaced to a certain extent by the injection of what is called a "physiological" solution of chloride of sodium; even filtered sea-water has been successfully used for the purpose.

In the fishes there are, besides the teeth, small sense-organs distributed over the whole skin. The purpose of these is to test the qualities, especially the saltiness, of the water in which they are. Fishes, one might almost say, taste with the whole skin. In us the faculty is confined to the mouth, where it is accomplished by just the same sort of organs, little bud-shaped structures. Here, again, we have a reminiscence of the marine phase of our early history. The narrow range of this sense also is peculiar, as it only informs us that things are sweet, sour, bitter, or salty. The chief qualities of what we think we are tasting are really learned by smell, as we can easily discover by experiment.

The teeth also are now confined to the mouth. They were found most useful on the edges of the jaws, and there they grew to a considerable size. They entered the service of the alimentary system, first being used simply to keep food in the mouth and then for breaking it up—a division of labour that has left clear traces in the different shape of our incisors and canine teeth on the one hand, and molars on the other.

The teeth in the jaws were at first renewed constantly, like the teeth on the skin. This ideal state of things has been lost in the case of the higher vertebrates, but the advantage has been compensated by a better attachment to the jaws. Originally the teeth-scales were loose in the skin, and they were not directly connected with the jaws. Then the lower part of the teeth developed into “roots,” which ran into the jaws. This is the rule amongst the mammals, but exceptional amongst the reptiles (the crocodile, for instance). Little pits, or *alveoli*, were evolved for the teeth to lodge in. Of the original faculty of reproducing the teeth constantly we now have only the “change of teeth” in the child, when the “milk teeth” (twenty in number) give way to the “permanent teeth” (normally thirty-two); but there are many indications of a larger capacity for forming

new teeth. Before the milk teeth develop, there are rudiments of other teeth, but they come to nothing. After the second "dentition," even in advanced age, there may be further new teeth. Some men have in their palate, behind the incisors, small "supporting teeth," which have to be removed by the dentist. Teeth may even appear in the middle of the palate; which is a reminiscence of the time when the whole cavity of the mouth was lined with teeth.

Man is well provided with teeth in comparison with some of his mammal relatives. Not infrequently another pair of teeth appears beyond the "wisdom teeth," especially amongst lower races like the Australians. Superfluous teeth may appear also in other places. The rule is to have two incisors on each side, above and below, but there are sometimes three. Next to these are the canines, which preserve primitive features in their simple pointed shape, whereas the incisors have developed into sharp chisels. The premolars, generally two in number, though there may be three, have two tubercles and the molars four or five. The regularity of man's teeth, to which we have already referred, enables us to draw important conclusions as to his position in the mammal world. For each group the teeth are very characteristic and indicative of the life-habits, and they give us important clues to the affinities of the various groups.

The teeth of the mammals have become adapted to very different requirements according to the nature of the struggle for life in each group. In virtue of the general law that organs which are much used grow larger at the expense of others which are less used, and therefore degenerate, different types of teeth have been developed or have deteriorated in the various mammal groups. Natural selection, which Darwin first pointed out, has had full play. Some animals preyed upon others, and the former became carnivores, the latter specially equipped for flight. In the carnivores the canine

teeth were most developed, as they were most useful in killing the victim and tearing up its flesh. The other teeth degenerated. The colossal development of the canines of the "sabre-toothed tiger" (*Machairodus*) of the Ice Age, which could tear open the thick hide of a rhinoceros or an elephant, is an extreme instance of this.

It was otherwise with the vegetarian mammals. Their canines were of no importance, and they decayed or disappeared. But the hind teeth developed into a masticating apparatus that had often to crush enormous quantities of food. The ruminants are an extreme form of this group. The rodents are another special

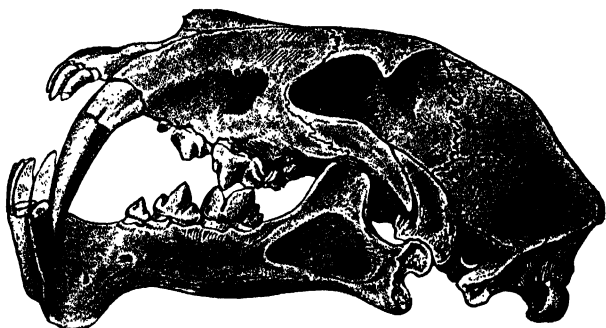


FIG. 13.—SKULL OF SABRE-TOOTHED TIGER. (ADAMS.)

form, with the incisors developed for the purpose of gnawing hard food; in their case the teeth have the faculty of replacing from the root the substance that is lost at the crown, so that the teeth are constantly growing. In some animals the incisors have had remarkable developments. In the narwhal they have become weapons; in the elephant, organs for clearing a way through the forest. In some cases the teeth have disappeared altogether—in the ant-eaters, for instance—as a consequence of adaptation to a special diet.

Human beings exhibit none of these special developments of the teeth. At the most we might quote the chisel-like shape of the incisors, which has developed

for the purpose of stripping the peel off soft fruit. The feature is common to man and the apes. Possibly, also, we might see an adaptation of the molars to crushing small



FIG. 14.—TEETH OF A NEGRO (above) AND OF
LE MOUSTIER MAN.

hard-shelled fruit. On the whole, however, man's teeth are remarkable as a survival of the original condition which was the starting point of all the various types of mammal teeth. Thus man is extraordinarily "primitive"

in regard to his teeth. They could not possibly have developed, for instance, from those of a lion or an ox; but it is certain that at some remote period the ancestors of the lion and the ox must have had teeth similar to those which man has to-day.

It follows that there can be no question whatever of the evolution of man from any existing type of mammal, and that he must have parted company from them at the very root of the family—like the other Primates, which have teeth similar to his. On the evidence of the teeth, therefore, man's ancestors must be described as *very ancient types* in the geological sense.

We do not know the region in which the ancestors of the higher mammals lived during the Secondary Period, but we can gather certain external conditions of their life. The principle of natural selection does not quite explain them. Certainly the principle represents a factor of development, but not in the sense that they must continually rise to new stages. All the mammals are fixed types as soon as their teeth have become adapted to their special work. A lion can never be converted to vegetarianism, or an ox learn to stalk prey.

If we take the word "advance" in the sense that some special result is brought about, we may legitimately admire all that has been done by natural selection. But we must not forget the sacrifice that was involved—the surrender of the capacity for continuous evolution. The lower mammals have got into no-thoroughfares, in which they can neither move backward nor forward. Man alone—to ignore the other Primates for the moment—has, by preserving original features, retained the capacity for further development.

CHAPTER II

THE EVOLUTION OF THE BRAIN

THE conception which our study of the teeth led us to form must now be tested by applying it to other parts of our organisation. One very profitable field for this kind of investigation is the problem of the evolution of our limbs. It is clear that almost no other organ of the body had so great a significance in connection with man's development as the hand, that remarkably versatile natural implement without which nothing artificial would ever have come to birth. Without the grasping mechanism which is afforded by the power of opposing the thumb to the fingers our ancestor would never have been able to lift a stone from the ground, to break up bones or to make the primitive flint implements with which they could eventually fashion their spears and boomerangs. Wherever we find these simple auxiliaries—clearly chipped stones—we have dumb but eloquent witnesses to the presence of a human hand.

The question how man obtained his hand is, therefore, of great interest. If we are to conceive him as the final term of a long and laborious evolution, have we to regard the hand itself as the final stage of a gradual evolutionary process? In that case we should expect the living mammals to illustrate earlier stages of this process.

But that is not the case. When we try to compare the living mammals of to-day with man in respect of the hand, we find in the great majority a state of things that seems at first sight to have nothing in common with the human structure. Think of the claws of the carnivore

or the hoofs of the swifter herbivores—how are those to be brought into any relation to the human hand? There is only one small group of the mammals, the lemurs, which have a marked resemblance to man in this respect. Their arms end in a prehensile apparatus—a strong thumb, standing out well from the four fingers—which unmistakably approaches the type of the human hand. This is true also of their hind limbs—they are *Quadrumana* (four-handed)—so that we have here a feature that was recognised by Linné as belonging to the Primates.

We will not for the moment grudge our ape-cousins



FIG. 15.—A LEMUR'S FEET (WITH CLAW ON SECOND TOE).

this description, though they cannot properly be said to have hands in the strict sense. It is undeniable that in substance they have on their arms and legs prehensile organs like those of man. It is true that the human foot makes man very different from the four-handed animals—a point we will consider more thoroughly later—but the foot was developed out of an organ similar to the hand, such as we find it generally amongst the apes and monkeys. The ancestor of man was quadrumanous, and so we have a single primitive type for the whole of the Primates. The hands were probably used for climbing,

as they still are by the lemurs and monkeys. This gives us a morphological and physiological foundation for comparing the primitive type of the Primate with those of the other mammals. There are various ways open to us for filling up the apparent gulfs between the fossil remains, but the simplest and the best way to understand the facts is to consider the extremities of all the mammals from the point of view of comparative anatomy.

When we study them in this way, we recognise a general identity of ground-plan behind all the differences, and this enables us to link up the mammal with the primitive type of the whole of the land vertebrates; in fact, we discover features which are common to all vertebrates which have two pairs of limbs. Some of the lower Chordates have not these limbs, and we cannot tell whether they have lost them or never had them. In view of the comparatively small number of earlier forms that have been preserved in the Earth's crust, it is not surprising that at present we are ignorant of the earliest condition, the origin of the limbs. On no other point in morphology has there been so much discussion, but up to the present it has had no tangible result.

The great majority of the living fishes are by no means primitive types, and they therefore give us no clue to the origin of the extremities. The most important fact we can quote from comparative anatomy is that the limbs always take the form of a front and back pair, apart from obvious cases of atrophy (as in the serpents). This distribution—a pair near the head and a pair near the hind end of the alimentary canal—is easier to understand in creeping or climbing animals than in those which swim. We have therefore considered the possibility that the majority of the fishes of to-day advanced a considerable way in the direction of the land vertebrates, and then retreated once more, so to say, to the watery element. It seems at first sight a remarkable theory, but there is in its favour the fact that the very oldest

types of fishes (Ganoids and Dipnoans) have a respiratory apparatus which strikingly reminds us of the amphibia. The *Ceratodus*, a Dipnoan found only three decades ago in two rivers of Queensland, and popularly known as the "lung-fish," is closely related to fossil forms of the Secondary Period. It is itself a "living fossil," to use Darwin's paradoxical expression, and it has certain peculiarities of the limbs which are intermediate between the fishes and the land vertebrates.

In the primitive fin (Archipterygium) we distinguish

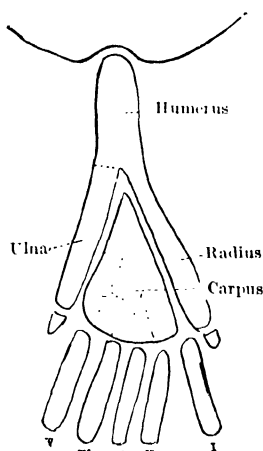


FIG. 16.—HOW A FIN MAY EVOLVE INTO A LIMB.

an arch-shaped part which is fastened to the body and a free part, consisting of the rod-shaped skeleton of the limb with feathery rays of cartilage, both surfaces of the limb being covered with muscle. A flat structure of this sort, used for locomotion, we call a fin. In embryonic development the limbs of all the vertebrates, including man, assume this form at first. Short plates, round at the edges, appear at the sides of the trunk, and the structure gradually takes shape. Rays—the rudiments of the fingers—issue from it, and the whole mass grows longer. Even in the adult condition we can recognise ancient

fin-action in the turning movements of the lower part of the arm and the hand; and between the various parts is a skin which we can identify as the skin originally developed for swimming purposes.

The arch-shaped structures to which the "free limbs" are attached are the shoulder girdle and the pelvic girdle. They are primitive features of all vertebrates. The hind girdle is always connected with the vertebral column, while the former lies free between masses of muscle. The similarity of the shoulder girdle to a gill-arch led the famous anatomist Gegenbaur to connect the early history of the fins with the gill-arches; but the theory has not yet met the difficulty of explaining the hind limbs. On the other hand, some of the English morphologists (Mivart and Balfour) attempted to derive the pairs of fins from unequal fringes or folds of the skin on the backs and tails of the fishes.

We need not go further into this play of opinions. We do not know. For our purpose, to understand man, it is quite enough to connect the earliest condition of all the vertebrates with some such primitive fin. If we imagine the girdle of the limb with a plate of cartilage attached to it and the edge of this jutting out in rays, we can easily understand the formation of the arm and the leg. The most important point is the hand. The rays at the edge have separated into so many successive pieces, and these are now the skeleton parts of the middle hand and the fingers. The latter, in turn, are now composed of three flexible sections, the phalanges. The parts of the middle hand are connected more firmly, and they are securely fastened to a plate which is called the carpus (wrist). This corresponds to the original central skeletal plate of the primitive fin, but it is now broken up into a number of small parts. All the other sections of the skeleton of the limb form a sort of stalk for the terminal plate and its rays. This stalk also has very probably developed from terminal rays which the

fin-plate pressed off the girdle, and which then became supports of it. There is a remarkable agreement between the front and back limbs in all these points, and also in the fact that the stalk of the limb has developed a bend: which we may regard as an adaptation to the use of the limbs of land. If we imagine a fat, salamander-like body crawling along by means of these primitive limbs, we see clearly that the weight of the body would of itself lead to a bending of its supports. As the front and hind limbs would act differently in this respect, we quite understand that the bend will be different in each case. Thus we get the explanation of the opposite directions taken by the bend of the elbow and the bend of the knee.

The front limb has to pull the body forward, the hind limb to push it. We can observe these movements in the case of the tailed amphibia, especially the newt, the snake-like movements of the trunk showing how at first the whole body took part in the process of locomotion. Comparison with the climbing mechanism of the higher animals (including man) brings out the meaning of the forward bend of the back limb and backward bend of the front limb. We have only to think of the way in which we grip things with the arms and feet. It is very probable that the passage from life in the water to life in the air, for which there were favourable conditions in the very swampy forests of Carboniferous and earlier times, was connected from the start with climbing. There are even now fishes which have nothing to do with land vertebrates—they are found on coral islands and in thick mangrove swamps, for instance, on the coast of West Africa, and in the South Sea Islands and Australia—which illustrate the attempt to get clear of the water by leaping and climbing.

In all the land vertebrates we have the same general plan of the stem of the limb—a single “proximal” section, next to the body (upper arm or thigh) and two

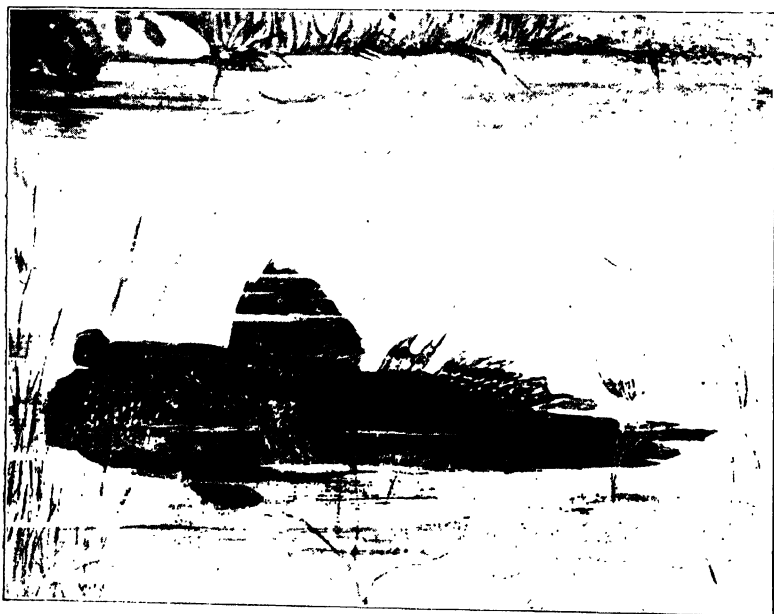


FIG. 17.—THE PERIOPHTHALMUS : A FISH WHICH CAN TAKE OXYGEN THROUGH ITS TAIL.

“ distal ” sections farther away from the trunk (ulna and radius of the arm, tibia and fibula in the leg). Similarly, all of them have the fingers or toes reduced to five at the most. This principle (“ pentadactylism ”) or law is clearly connected closely in its origin with the development of the hand for grasping purposes. There would be no use in having more than four fingers, as there were originally in all cases, when the thumb is opposed to them.

It is important to show that the land vertebrates generally had four hands in their primitive state. The facts of comparative anatomy, in the first place, compel us to assume this. Whenever the five fingers seem to be equal, we find on closer study special features in the innermost digit when the limbs are on the ground. However much the skeleton of the limbs has been modified, this first digit never loses its peculiarities. In the case of the mammals, without exception, we can show that the terminal parts of their limbs are built on the principle of the hand, or the grasping organ. In the early days of the spread of Darwinian ideas it was a great triumph of the new theory to be able to show how such a thing as the horse's foot could be developed out of a five-toed foot by atrophy of four of the toes. Palaeontology brilliantly confirmed the theories of the morphologists by discovering the fossil remains of the ancestors which had been theoretically ascribed to the horse: types which lost one pair of toes after another until only the strong central toe remained as the support of the body. It was a good illustration of the action of natural selection, on one side, producing from the stem of the ungulates an animal that had a remarkable power of running—running away from its enemies. But the other side of the matter, that the earlier five-toed ancestors of the horse must have been closely related to the Primates, was not clearly realised. The grey spot on the inner surface of the horse's leg reminds us of the ancestors of the Primates, as it is a relic of the nail of the big toe (or thumb).

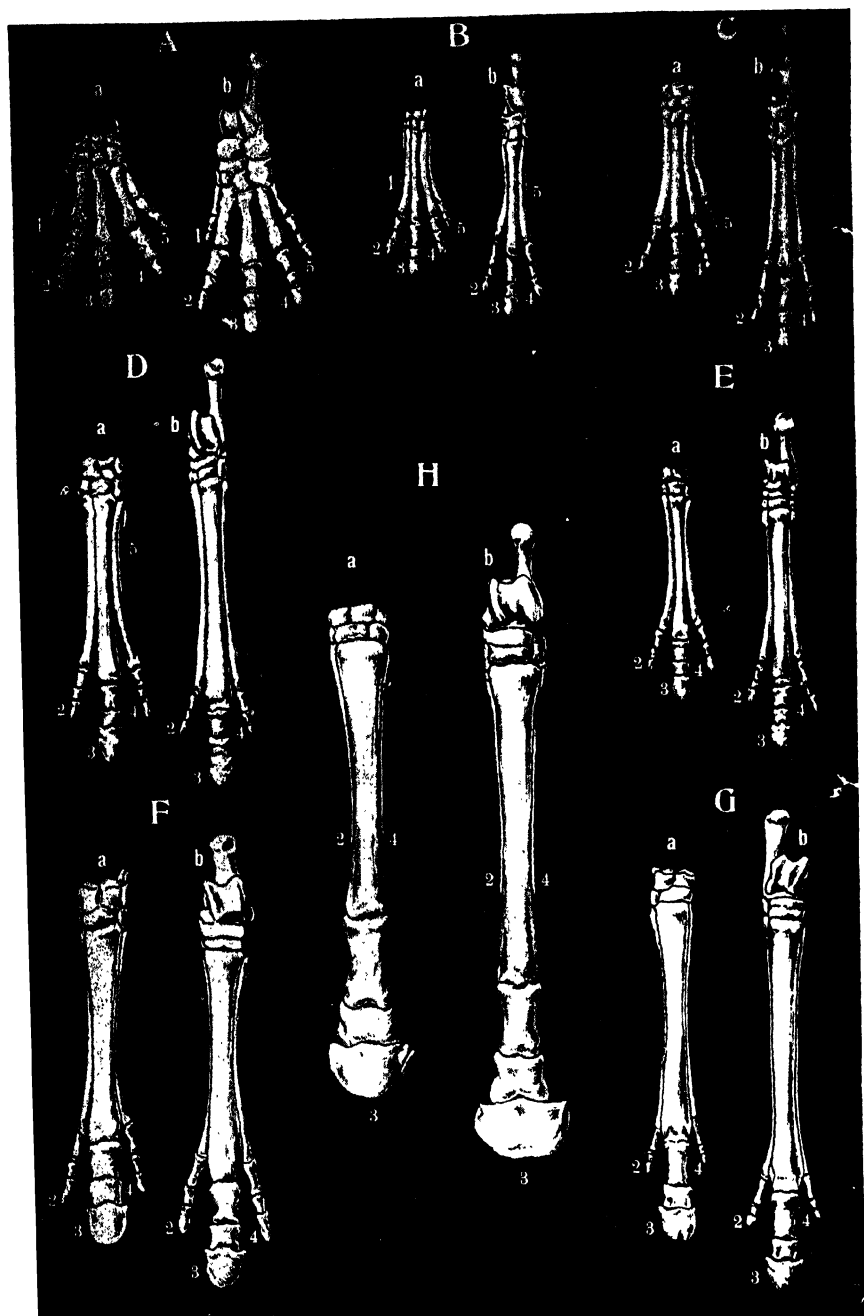


FIG. 18.—THE EVOLUTION OF THE HORSE'S FOOT. (LULL.)

A. Phenacodus. B. Eohippus. C. Orohippus. D. Mesohippus. E. Miohippus. F. Hypohippus. G. Neohippus. H. Equus caballus.

Whichever group of the mammals we choose, the "primitive" features can be detected. The hand can be recognised in the bat's wing or the mole's paw, or the carnivore's foot with equal facility. Here again palaeontology has, with its fossil discoveries, amply supported our theories. The oldest fossil carnivores, from the early Tertiary, the Creodonts, clearly illustrate the structure of the human hand. We can show it also in the case of the reptiles. The gigantic Iguanodonts of our museums



FIG. 19. — THE EARLIEST KNOWN FOOTPRINT
(PERMIAN). (PABST.)

have real hands, the thumbs standing well out, armed with their weapon.

But the best proof that man preserves the primitive condition in his limbs as well as his teeth lies in the fossil footprints of animals which lived in the Primary Era : indeed, in an age which has left us no remains of land vertebrates. At Tambach, in Thuringia, we have found, in sandstone which is a little earlier than the Carboniferous Period, certain footprints which have a striking

resemblance to the imprints of the plump hands of human children or of fairly advanced embryos. The contracted hand clearly shows the short, thick thumb and its ball. The "back hand" has the same structure; and it is this which, in imprints from a later deposit, so clearly resembles a human hand that the creature from which these impressions come was at once called the "hand-beast" (Cheirotherium).

Up to the present we have not found any remains of these organisms. They seem, however, to have been widely spread in the earlier part of the Secondary Era, as they have also been found outside Europe. We know nothing positively about their skeletons, but we can infer from the imprints of their extremities that they must have been closely related to the mammals. There are amongst the lower mammals of our own time some whose feet are so like those of the Cheirotherium that they do not rest the whole surface on the ground (as the human sole does), but lift up the heel part. We can tell by examining the back edges of the imprint, in which we see the resemblance to a hand, that this was the case with the Cheirotherium. The real hands are smaller, and are in front of the foot imprints. We can see from the difference in size that the Cheirotherium's hind limbs were longer than its fore limbs. The more ancient imprints at Tambach do not, however, show these proportions. In their case the hands and feet are nearly the same size; and this was unquestionably the primitive condition of all the land vertebrates.

Man illustrates this primitive condition quite clearly in his embryonic development. The lower limbs do not become the larger until after some time. The hand and the foot are alike. In the human embryo during the second month after conception the foot is still like a hand, so that the human being is at this stage quadrumanous. When he comes into the world, he is a half-crawling, half-climbing organism, recalling the ancient Cheirotherium.



FIG. 20.—SKELETON OF A NEW-BORN CHILD
(arms and legs nearly the same length).

The hand of the new-born child is remarkably strong in comparison with the rest of the body. Its muscular power can easily be tested by letting it hang on to a stick. Babies are quite capable of supporting themselves in this way, and the body then adopts the position of a climbing animal. The feet are held with the soles placed together, as if they were clasping the trunk of a tree. It has been contended that the appearance of the feet is due to confinement in the narrow space of the womb, but comparative study of the lowest mammals, especially the marsupials, which undergo the greater part of their development in the pouch on the ventral surface of the mother's body, shows that this is the typical condition of the young mammal. *Its ancestors were climbing animals.* The opposability of the thumb and the big toe was not gradually evolved in the case of the land vertebrates; it was developed at the time when the primitive fin of the fish ancestor was converted into a limb. The number of the fingers and the character of the hand as a grasping organ are fundamentally and originally connected.

We may go a little farther back and ask how this prehensile organ was developed from a fin. Here we reach the limits of our knowledge. We have, it is true, many facts which suggest that in the ancestral fin itself there were differences between the various terminal rays which became the thumb and fingers; but these very difficult questions need not be more closely considered here. As far as man is concerned, it is enough that his hand is part of the primitive organisation he has inherited from the early land vertebrates. It should also now be clear that the practice, which was very common at one time, of regarding man as the final outcome of a long and slow evolution, is in this respect wrong. These things could be said as long as it was believed that man could have descended from a "quadruped" ancestor: a possibility which was quite seriously discussed by learned men. No comparative anatomist can now regard it as other

than nonsense. It would mean that the terminal parts of the limbs of the ancestor in question had the shape of feet: which means that they were merely for support and running. The ungulates are typical examples of this. As long as our ideas of the earlier history of the mammals were vague, we could find no starting point for the evolution of their limbs. Now that we know that climbing was the original function, we must regard all feet as modified structures. We do not mean to say, of course, that the earliest land vertebrates did not go on all fours, just as the human child does to-day. They did, as the amphibia do to-day. There are features in the human hand to-day which show that it once rested on the ground. The pad or "ball" on the outer edge of the flat of the hand plainly represents a kind of sole with a cushion of fat, and it has certain structures to protect the deeper-lying parts from pressure when it rested on the ground. There is a small special muscle for this purpose. The human hand comprises all conditions—it is a universal organ.

Man has retained this very valuable instrument, while the other animals have, with a few exceptions, forfeited it by experiencing various modifications which destroyed its versatility. As we said above, these modifications are themselves processes of evolution. In a sense we might speak of different degrees of "perfection," when we regard the special qualities of the mole's shovel, the bat's wing, the lion's claw, the horse's leg. But, when they obtained these organs, the animals in question forfeited the chance of developing in other directions. Man remained versatile and open to different possibilities—and there we have the key to a good deal of the mystery of his extraordinary success.

This is a different interpretation of evolution than that of the older Darwinians. Man is not a triumph of natural selection. On the contrary, he made progress because he was spared the sacrifices required by natural

selection (and made by the horse, bat, etc.). He kept his hand. Any person who wants miracles need not turn to the realm of the supernatural. Nature, even human nature, has miracles enough. On all the laws of probability the exceptional position of man, as compared with the other animals, is very strange. It is not the possession of the hand as such—for it was once common to all vertebrates—but the fact that the structure was

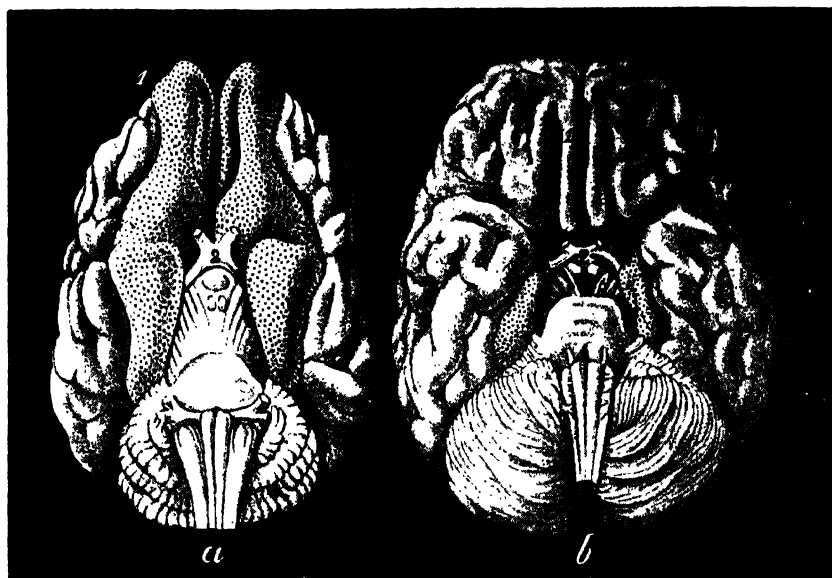


FIG. 21.—BRAIN OF DOG (a) AND MAN (b).
Compare the size of the centres of smell (dotted).

preserved in its original features, and that it could be pressed into the service of a large brain, that is remarkable. How very easily might it not have happened to the Primates as well as to the other mammals (except the lemurs) to lose the thumb by adaptation of the hand to some special purpose in the struggle for life!

The other Primates illustrate how this might have happened to primitive man, as none of the apes or monkeys has quite escaped this destructive agency. In every case

the thumb has degenerated, though in different degrees. That is why the apes have not become men. That they were on the way to reach the human stage is clear from the fact that their ancestors had hands, and from the characters of their skulls, which show that enlargement of the brain on which the human quality depends. The apes, however, did not complete this development. They degenerated at various periods. Fossil apes of two million years ago show better skulls than their descendants have to-day.

In order to understand more clearly this conception of the apes as failures to become men we must consider the features which apes and men had in common in their ancestors. These features, common to the Primates, are the superior development of the brain, the forward direction of the eyes, and the human type of dentition (2 incisors, 1 canine, 2 or 3 premolars, and 3 molars): apart from the possession of four hands, with which we have sufficiently dealt.

The name "Primates" given to them by Linné, very well expresses the "primitive" elements which distinguish them amongst the mammals; though it really means the "leaders." The ancestors of the other mammals were more closely related to the Primates before their special evolution; the earliest ungulates and carnivores were something like the lemurs. The mammals of this stage, near the root of the stem, may be called the "Primatoids." The separation of the Primates themselves from this group was effected by modifications of the head and the organs of sense.

The earlier phases of our sense-organs go back to the remote period of our Chordate ancestors. We find the fortunes of the organs of smell, sight, and hearing inseparably bound up with those of the brain, and all of them were derived from processes which originally took place in the external skin, which reacted to the various stimulations of the environment. The entire

nervous system develops from the ectoderm in the embryo. Our brain was at first a sensory apparatus. It gradually sank deeper into the body, and was overlaid by other parts, but it maintained a connection with the surface. The outer parts were its advance posts, the messengers of what happened in the outer world, while the "central" part had the function of receiving and combining the stimulations and initiating corresponding movements of the body. The "wires" connecting the central nervous system with the sense-organs and the muscles were

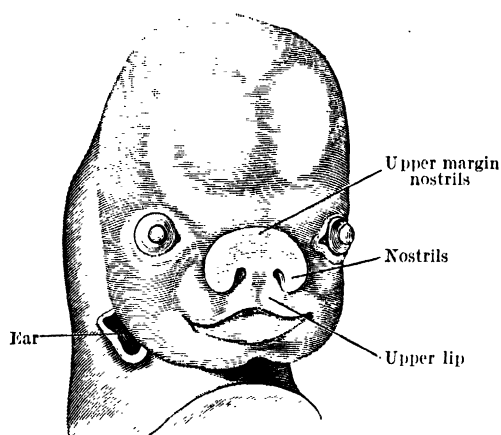


FIG. 22.—FACE OF HUMAN EMBRYO (first month), WITH LATERAL EYES.

constructed of cell-processes of considerable length, and these, packed together in bundles, are the nerves. The modern telegraphic system gives one a good elementary idea of the mechanism. The central apparatus is the office at which messages are received and re-dispatched.

The smell is one of the oldest of the senses. An organ in the front part of the brain is in communication with the surface-organs, which are in the case of fishes a couple of depressions in front of the head. In the land vertebrates these have developed into tubes, and they are connected in the rear with the respiratory apparatus.

The original function was to test the gaseous constituents of the surrounding water, then, in land vertebrates (in which the mucous membrane must still always be kept moist), the matter floating in the air. By this power of perceiving emanations from bodies round about them the smell-apparatus of the land vertebrates has become a very important instrument in the search for food and the discovery of other animals—whether hostile or attractive—so that in the lower mammals the nose is selected even more than the eyes and ears.

The latter organs, for the perception of vibrations of air or ether, are obviously later acquisitions. The pair of eyes must clearly have a complicated early history, pointing to a condition in which light penetrated into the inner nervous system through delicate body-walls or membranes. The retina of the eye is to-day an advance post of the brain, and the lens and eye-muscles—the one developing from the skin, the other probably from the gill-apparatus—have been added to it. We have very little trace of a former connection with the old eye on the top of the head (occipital eye).

The organ of hearing is the latest acquisition of the vertebrates. It was originally a depression in the skin provided with apparatus similar to those which, as we said, are found all over the skin in fishes.

These acquisitions have been very important in connection with the development of the brain. At first the chief part was that connecting the brain with the spinal chord. It is still the seat of the centres of vital functions (such as breathing) injury to which means instant death. Hence it is that the carnivore instinctively gets its teeth into its victim's neck. All that lies in front of this "medulla oblongata," as it is called, serves the functions of the sense-organs and the mental life. The larger part of it, which is responsible for the dome of the skull, is the cerebrum, divided into right and left "hemispheres." Behind this is the cerebellum, the

seat of the sense of balance, which is related to the sense of hearing.

We will not go into the details of the structure, but will select a few points that are indispensable when one wishes to understand the evolution of man.

A large brain is common to man and the other Primates, though in the human case we have the extreme of development. They have also in common a very slight development of that part of the front of the brain which is particularly well developed in the other mammals—the centre of smell. Here there have been modifications which depend upon changes in the part played in the organism by the various sense-organs. In the case of the Primates the sense of sight has come to play the preponderant part. But the very considerable difference of the brain of the Primates from that of other mammals is not merely a question of the physical process of receiving visual impressions or even the simple perception of such impressions; it is a question of the intimate connection between visual impressions and the other functions of the brain—a question of enlisting the sense of sight in the service of the mind. It is only in the Primates that the eye is the window of the soul.

The history of this development is extremely interesting, as it throws much light upon the evolution of the form of the head and face. In the human face the eye is the chief feature. Most of the lower mammals have a very rich development of the internal part of the nose, so as to give a large surface that is sensitive to odours, but in man the muscles are only slightly developed and the sensitive surface is much smaller. In most of the other Primates the part is even less developed. There is no doubt whatever that our sense of smell is much feebler than that of most of the other animals. Man is “the bottom dog” in that respect; in fact, if the dog were able to express an opinion upon his master’s nose, it would be far from flattering. There has certainly

been some degeneration on man's side. He is assuredly not "the crown of creation" in regard to this sense.

This is, however, one of the few penalties man has had to pay for his development, and it has compensations. The substitute we have received for it was well worth the sacrifice—it is the power of seeing bodies "stereoscopically," which enables us to judge their size and distance. This is only possible when the axes of vision of the two eyes are perfectly parallel. Otherwise each eye has a separate picture of the object, and this is the general condition in the animal world, as the eyes are

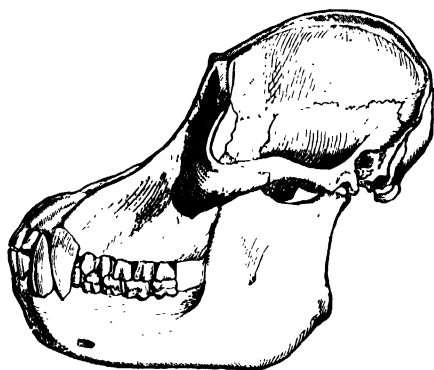


FIG. 23.—SKULL OF AN ORANG (WITH EYES DIRECTED FORWARD).

directed sideways, instead of straight in front. The difference between our stereoscopic vision and their separate pictures can be realised by covering one eye with the hand. We then fail to recognise the distance of one object from another, and seem to see a flat surface. When we uncover the second eye, the picture gains in depth, and we see the objects as in a stereoscope. By closing each eye in turn, we can easily realise that each of them has a separate picture. An object near at hand changes its position according as one or the other eye is open. The combination of the two pictures into

one enables us to see a little of both sides of an object, and this really gives us our idea of a body.

The animals, with their laterally directed eyes, are in an unfortunate position as regards many objects. Apart from the fact that it must be confusing to have a different picture in each eye, they often fail to recognise whether an object looks big because it really is big or because it is close to them. It is thus easy to understand a horse taking fright, or a large animal being frightened by a comparatively small creature like man.



FIG. 24.—BRAIN OF A FIVE-MONTH HUMAN EMBRYO.
(KLAATSCH.)

This state of things can only be changed by bringing the eyes closer together, so that they look straight forward and can be focussed on a common point. There are two elements in this: the shifting of the eye-orbits nearer to the nose, and the voluntary control of the muscles so as to bring the pupil of the eye in a certain direction. That the first process is not enough of itself we see in the case of the new-born baby. The orbits are properly placed, but the baby has not yet got the

faculty of "keeping its eye" on an object. The pupils roll about, as if they were looking for something. It requires months of effort before the axes of vision are brought parallel to each other. At six months the child has learned to recognise objects and persons, and its contented smile announces the victory in the struggle in which the child repeats the long efforts of our ancestors. That our ancestors had their eyes directed sideways can easily be seen by examining the human embryo. In the second month of development the eyes are placed at the sides; as they are in many dogs and cats. At this stage the nose is in its primitive form—a flat nose, something like the end of a pig's snout. The nostrils open straight forward. The eyes are at a considerable distance from each other, the whole breadth of the flat nose lying between them. Then, from the second to the fifth month, we see all the stages of a gradual approach of the eyes, the sinking and narrowing of the nose, and the development of a deep groove above the nose.

Even at the present time men differ a good deal in regard to the distance of the eyes from the centre. The "pupillary distance"—distance from the central line to the centre of each pupil—differs greatly in different individuals. Many races, such as the Mongolians, are characterised by a remarkable breadth between the eyes.

The position of the eye-orbit also differs a good deal in different individuals. In most cases the bony orbits are not directed quite forward, but look obliquely, being directed a little to the side. It is only in certain cases—the Eskimo, for instance—that they look straight forward, in a flat plane like the lenses of an opera-glass. This is almost the general rule with the apes. In this respect man has not gone on to the extreme of development reached by the apes. We are reminded once more how inaccurate it is to regard man as in every respect the most advanced in evolution. Many of his features are

more primitive than those of the apes. This is seen very clearly in the outer rim of the eye-orbits. In the case of animals with laterally directed eyes there is no bony partition between the hollow in the skull in which the eye lies and that in which the muscles for mastication are. In other words, the bony eye-orbit is not perfectly defined. Clearly, a state of things in which so important a sense-organ shares its home with muscles of the alimentary system is backward. The development of a bony partition between the two cavities is an advance; and it has developed better in the apes than in man, in whom there is still a groove that is a relic of the earlier state of things.

On the retina of all the Primates, in the direction of the visual axes, there is a small field of particularly acute sensation—the “yellow spot” (*macula lutea*). Here the various strata which compose the retina become thinner, and leave the rods and cones, the real sensitive apparatus, more exposed to the rays of light.

In respect of the destructive influence of the encroachment of the eye-orbits upon the nostrils, the majority of the apes are in advance of man. In many of them which are closely related to man, such as the orang, the distance between the eyes has become extraordinarily small. Yet men have retained a better sense of smell than the apes, and from this we may conclude that the avoidance of the extreme in regard to the position of the eyes was an advantage.

These changes of the face were found to have some influence on the shape of the part of the skull which contains the brain. At first the top of the skull was quite flat, as it is in the lower vertebrates (the amphibia, for instance) to-day. In the lower mammals the larger development of the fore part of the brain begins to raise the skull. The wall—originally cartilage, later bone—gives way. We can lay it down as a general principle that the supporting tissues are always passive in relation

to the nerve-mechanism. It is also the fact that during embryonic development all parts of the nervous system are remarkably large from the start, and they take up, comparatively, more space than in the adult. In the embryos of lizards, for instance, which have flat skulls in the adult, the head rises in a high dome, as the eyes are extraordinarily large. The whole head is relatively large in the young animals. As the protecting tissues are particularly elastic at this early stage, we see that the skull will be the more easily shaped if the primitive conditions are kept for some time. We find the same thing in the case of the mammals. Kittens and puppies have more rounded skulls than cats and dogs have. Even the young of the Ungulates look better in that respect than their parents do.

The shifting of the eyes forward was bound to help in this enlargement of the skull. Their lateral wall was set free, and the brain could expand there, whereas the lateral eyes had prevented this. Hence in the Primates a new lobe is developed in the brain—the “temporal lobe” (Fig. 24)—whereas in the case of animals with lateral eyes this can scarcely be clearly separated from the rest of the brain. Its delimitation from the frontal lobe is all the sharper, as the development led to a degeneration of the part of the brain connected with smell. This deepened a fissure—the “Sylvian fissure”—which already existed between the frontal and temporal lobes. A third lobe, the “occipital,” is very highly developed in the Primates, as the centre for the combination of visual impressions is localised on the edge of it. It is directly connected with the eye in all the mammals, but the region is peculiarly complicated in the case of the Primates. There is a deep fissure on the inner surface of the hemisphere, a fold of the surface of the brain, which is so pronounced that it juts out against the ventricle, and was called by the older anatomists “the spur” (*calcar*). The layer of grey nervous matter (cortex)

which forms the whole surface of the cerebrum, and is the instrument of the mind, is particularly developed in this region. Physiological and pathological experiments and observations have shown that the region is intimately connected with the retina, and that the impressions which fall upon the retina are here centralised and brought into consciousness. When this part of the brain is injured, the sensitiveness of the retina is lost. This centre of vision is particularly developed in the left hemisphere. As the part and its peculiarities belong exclusively to the Primates, there can be little doubt that the development of it is connected with the development of stereoscopic vision.

Thus the voluminous expansion of the brain is an expression of the development of vision in the case of the Primates. That is also why the skull is in their case so large in the rear; indeed, the whole rounding of it is a consequence of the development we have described. It is not merely a question of the hind part of the brain. As all parts of the cortex are interconnected, the elaboration of the visual centres had an influence on other sections, such as the centre for hearing, which is in the temporal lobe, and the motor centres, which are on the front edge of the "central fissure." Externally these developments appear in a multiplication of the folds (convolutions) and furrows of the surface of the brain, and these have regular patterns in all the Primates, with considerable variations in the case of individuals and groups. There is a fissure at the anterior border of the visual centre which was believed for a long time to occur in the apes only, not in man. We now know—it was a famous triumph of Huxley over Sir R. Owen—that the structure (the "hippocampus minor") is common to man and all the other Primates.

It is impossible here to give in detail the mass of knowledge we now have about the brain of man and the apes and the latest results of the study of the brain.

It is enough to say that man and the anthropoid apes have risen from a level of brain that was common to their ancestors and those of the ordinary monkeys. The other living groups have entered upon certain lines of development, in the brain and other organs, which have carried them farther away from the human line. The nearest living representatives of the primitive common



FIG. 25.—A JAVA GIBBON. (ZIMMERMANN.)

level are the gibbons: small man-like apes of the Indo-Asiatic islands. Apart from a number of very remarkable special features (their long arms, for instance, of which we will say more later), the gibbons are in their organisation not far from the starting point from which man and the man-like apes diverged in their several directions. They are clearly related both to the American monkeys

and to certain extinct European forms, and to several types of Asiatic monkeys. Their relationship to the African monkeys—baboons, etc.—is more distant. Possibly these are an independent branch.

In any case, we can say definitely that the monkeys and apes are divergent lines from that of man, and therefore could not be considered as ancestors of man. They have, in various degrees, in some cases altogether, lost the thumb by atrophy. The question that is so often asked, why apes do not now develop into men, can be answered at once by pointing to the thumb. But there are also other respects in which they have experienced modifications which are the reverse of advances to higher level. All have developed large, sometimes very large, canine teeth, and in this again they have diverged from the human type. Recent discoveries of fossil remains from the early Tertiary show that the primitive monkeys had teeth like the human, the canines being no larger than the others. The development of the baboon's face, with its formidable teeth, suggests an affinity with the carnivores rather than man.

It is types like the baboon that make the idea of a relationship to the monkeys seem to some so extraordinary. Unfortunately, most of the monkeys in our Zoological Gardens are of such kinds as to discredit the idea of man's relationship to them. A careful observer will, however, grant that it is unjust to judge the apes by a few of their representatives. There are pleasant and unpleasant monkeys—as well as men. Amongst the American monkeys there are some that behave very well as domestic pets. Such, for instance, are the little Capuchin monkeys, from which Garner tried to learn the “monkey language.” The howlers also are superior to many of their cousins in the Old World.

The games and amours of monkeys please some and disgust others; but the latter generally acknowledge that they see in these things a caricature of human

nature. These good souls may comfort themselves with the assurance that the monkeys do not give us an idea of our ancestors. Neither in body nor mind is there question of a direct descent of man from apes or monkeys. But all started from a common level, and there is still in man the germ of much that we find repulsive in the ape. But this is true also of good qualities, such as a mother's love of her young, which is too often regarded as something ridiculous in monkeys, or the courage of the males in defending, at great sacrifice, other members of the troop, or the many indications of a lively intelligence.

CHAPTER III

THE RELATIONSHIP OF MAN TO THE APE

THE three larger apes—the orang, chimpanzee, and gorilla—are distinguished amongst the Primates for their remarkable resemblance to man. They are put in a special group with the title “Anthropoid” (man-like); and the gibbon is usually included in this group.

This classification does not bring out the facts very clearly, and it leads to totally wrong ideas, sometimes even in professional literature. The impression is conveyed that the anthropoid group is on a level with other groups, such as the baboons. But, whereas the latter really do belong to one group, because they are closely related to each other, the only link which connects the various anthropoid apes is their resemblance to man. They have far more features in common by which they differ from man—the teeth, the hands and feet, and the proportions of the body—but careful study convinces us that these features will not serve as the basis of a close and intimate relationship. Some of these features—the canine teeth, the prehensile feet, and the degenerate thumbs—they share with the monkeys: other features, such as the relative length of the arms and legs, are peculiar to themselves (including the gibbon). Against these common features, however, we have considerable differences in their entire organisation. These differences are not so great between the gibbon and orang on the one side and the chimpanzee and gorilla on the other; which corresponds exactly with their geographical dis-

tribution, as the former pair belong to the islands south of Asia and the latter pair are found only in Africa.

This geographical separation of the Eastern and Western anthropoids may suggest that much that is common to the two groups may have developed independently, and that the resemblances may be due merely to similarity of conditions, but careful study of their apparent resemblances discloses special features in each case even as regards these.

We have already touched upon the central position occupied by the gibbon. It is the smallest of the four. If the body is taken as straight upright, like the human body, the height of legs, trunk, and body, in the larger specimens, is from forty to sixty inches. The arms are, however, relatively so long that, if we imagine the animal erect, as I suggested, the finger tips would touch the ground. Nowhere else in the animal world do we find arms of that length. All the bones of the upper extremity share the length—the upper and lower part of the arm, the hand (which is remarkably narrow), and the fingers. The thumb, however, is very small: a mere stump attached to the wrist! The legs seem short, and the foot is like that of various monkeys. The first toe, which stands out and is opposable, is short. There are horny growths on the buttocks, as in the case of all the Old World monkeys, but they are small. There is no external tail. The trunk is slender; the chest delicate. The head is finely rounded and very prominent behind. The roof of the skull runs down in front to great ridges over the eyes. The face is very man-like, as the mouth-parts are not prominent. The nose, however, is rather flat, and the nostrils are directed rather outward and downward, as in the American monkeys. The teeth have the same formula as in man, and they only differ from the human in a tendency of the canines to grow large. The male animals, especially the older ones, have large canines, though they vary a good deal.



FIG. 26.1.—AN ORANG IN ITS NEST.

The expression of the face, with its large dark eyes, is gentle, and is in harmony with the amiable and clinging character of the gibbon. There are none of the caricature-features of the ordinary monkeys. The gibbons have a sunny and happy temperament. Sometimes they live in large groups, sometimes in family groups. Their vocal capacity is the best in the animal world, as their larynx is not inferior to that of man. Their musical powers have often been extolled. *Hylobates agilis* can sing a full octave quite purely. Their concerts resound through the forests, as they generally live in the tree-tops. They swing from branch to branch, and tree to tree, with their long arms, moving almost as rapidly as birds. A soft coat of woolly hair covers the whole body, and the face is framed in whiskers. The hairless parts are dark in colour.

A number of varieties and species of gibbons have been distinguished—local forms of different colours and with other peculiarities, but they are not of substantial importance. Their region comprises the islands of the Malay Archipelago, especially Sumatra.

Here, and in Borneo, we have the other anthropoid ape of the East, the orang (*Simia satyrus*). Young specimens, which are often to be seen in our Zoological Gardens, are better for showing the resemblance to man than the adults; in fact, of the latter only one male specimen has reached Europe. In their first year the little orangs remind us of human children in their ways, while the old males look rather terrifying, on account of their huge jaws and powerful incisors. The nostrils, without much external nose, open above the rounded and outstanding mouth-parts. The eyes are comparatively small, and are close together. There are large cheek-pouches, hanging folds of the skin, on either side of the face; and this seems rather small relatively to the size of the head. Finely rounded in early years, the skull later becomes overgrown by the muscles of the jaws, which raise the



FIG. 27.—NESTS OF ORANGS IN TREES. (HOSE.)

top of the skull into a sort of comb. The head always bends forward, and the neck is very short. In this region there is a laryngeal pouch: a chamber that can be filled with air from the larynx and serves as a resonator when the animal is in a rage and roaring. The chest is enormously strong. The arms are long—much longer than the legs. The fingers are clenched and long, apart from the thumb, which is very short. The big toes have no nails. A tousled coat of reddish brown hair—not very thick, especially on the belly—covers the trunk, and limbs, and head, where it falls on either side.

The orangs live in the virgin forest, mainly up in the trees. They are not well adapted for moving on the ground, and they cannot cross rivers. That is why, in Borneo, districts that are separated by rivers have local varieties. There are also considerable differences between the orang of Borneo and the orang of Sumatra. They live in small groups which are more like families than herds. Each builds a sort of nest in the trees by breaking off twigs and putting them together. It moves slowly and deliberately. Its temperament, very differently from that of the gibbon, seems grave and melancholic. The expression of the face is quiet, and even in the older apes, in spite of their fierceness, it is dignified. Teasing quickly makes the orang angry.

The natives of Borneo regard the orang as a man, as the name itself indicates; for “orang” means man and “utan” wood, so the full name means “man of the woods.” They think that it could speak, but will not, for fear of being compelled to work. The young apes have not at all a savage or vicious character. They behave very well in houses, and many Dutch families in the colonies have them playing with the children.

Of the two African types the chimpanzee has a much wider range than the gorilla. The latter is confined to the Gabon district on the west coast, and is only found near the Equator. The chimpanzee spreads over a large

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part of central Africa as far as Lake Tanganyika, so that it is richer in species than the other anthropoids. Quite a number of different "races" of it are distin-



FIG. 28. THE CHIMPANZEE "MISSIE" IN THE BERLIN ZOOLOGICAL GARDENS.

guished. Possibly the whole group will later have to be divided into sub-groups.

Chimpanzees are now so common that the general public will know their chief features (Fig. 28). As a rule, they are smaller than orangs and gorillas, and they do not

change so much as they grow older. The skull is not so much overlaid with muscle, and the canine teeth do not become so large. They have the usual long arms and degenerate thumbs. They live socially, in troops. In temperament they are lively and high-spirited, but inclined to be vicious. Their resemblance to man is so extraordinary that the first chimpanzees to be imported into Europe, about 1700, were described as dwarfs or pygmies.

Most of the specimens in our Zoological Gardens come from the Cameroons, and are very dark in colour, both in regard to the hair and the exposed skin ; though there are varieties of a lighter shade. Some of them are known to make nests, as the orang does. The "chego," a special form of chimpanzee, makes a sort of roof to keep the rain off, and often mends it.

The gorilla, the giant of the Primates, occupies a special position amongst the anthropoid apes. The strongest men seem to have weak chests in comparison with the adult males of this group. Their arms are not merely long, but they have large and powerfully developed bones, especially in the upper part of the arm, the bone of which is nearly twice as thick as the human. The hand is the closest to that of man. It is true that the gorilla's thumb is shorter than man's, but the hand as a whole has not lost the power of grasping as man does. The ape defends itself with branches of trees, though its most terrible weapon is the strength of its own arm. One blow of its fist may be fatal. The old male must be a terrible sight when it stands erect, seizes its enemy, and crushes it against its chest, roaring and showing its great teeth, the canines of which will compare in size and power with those of a carnivore. It uses these also as weapons in fighting the other beasts of the forests, in which it lives. It is said that at night the male keeps watch at the foot of the tree in which the female and young are housed ; for the gorillas live in small troops which one might almost call families.

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We have as yet very little information about the psychic life of these giant cousins of ours: which is scarcely surprising, as the rifle is not the best means of

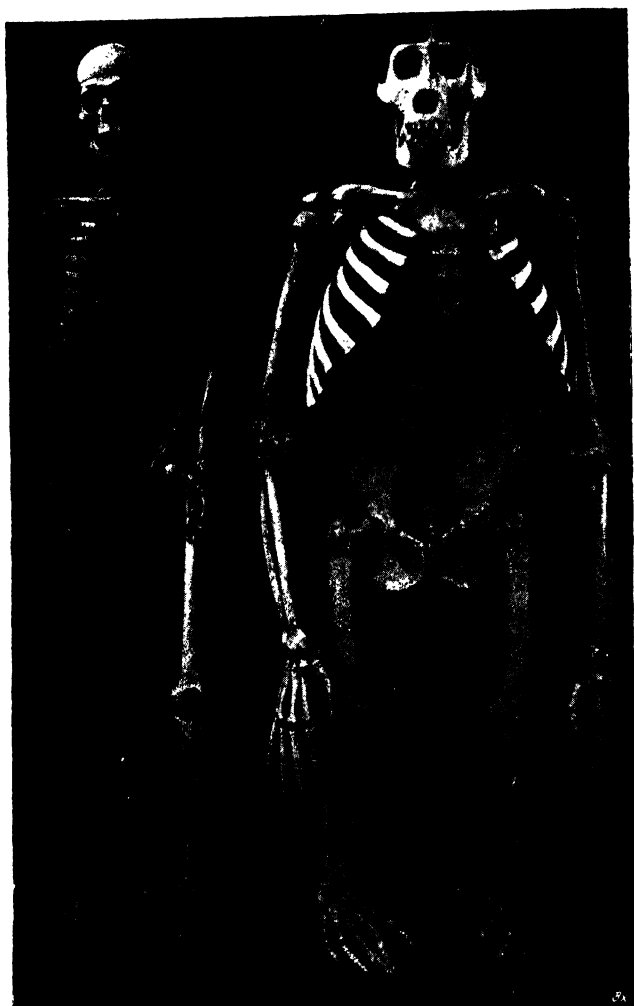


FIG. 29.—MAN AND THE GORILLA.

making the acquaintance of these creatures of the forest. Some recent observations tend to show that the gorillas are uncommonly human in their social life; that there

is something human in the behaviour of the adult males toward the gentler sex and the respect that is sometimes shown to the old. It is clear that the impression of animal ferocity, which is generally given by the animal when it is hard pressed and in a rage, is not "animal" in the strict sense of the word. It is due to fighting for life—when even men do not look very amiable. If, at times, they attack houses, it is rather a sign of intelligence and a faculty for retaliation. It is quite time something was done for the protection of the gorilla in West Africa, or we shall presently have to deplore the extinction of a race that is of great interest in connection with our own evolution.

The young of the gorilla are much more man-like than their parents. The head is rounded, and not yet overlaid with muscles which raise the top of the skull of the older animals (as in the case of the orang) into a ridge. It is not until the change of teeth that the jaws take on their formidable bulging appearance.

The temperament of the gorilla is rather gloomy; but it is very fallacious to judge these things from the poor little captives on which we make our observations. Up to the present we have only brought up one female gorilla—at Breslau—to sexual maturity. No adult male gorilla has yet been brought alive to Europe.

Recently A. Sokolowsky has made a series of interesting observations on the psychic life of the larger apes in Hagenbeck's Zoological Garden at Stellingen, near Hamburg. They are published in his *Beobachtungen über die Psyche der Menschenaffen* (1908). As to the gorilla, he quotes from Zenker: "The male gorilla is always accompanied by a number of females and young. When they are looking for food in the forest the young go first, the females next, and the male brings up the rear. The male goes very slowly and often stands erect to make sure that there is no danger. He has very good sight and still better hearing, and his scent is perfect. If he

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sees no danger, and is hungry, he goes up a tree, and the females bring him fruit and sit with him. Zenker saw two females with one male in this way. He put his long



FIG. 30.—A YOUNG GORILLA.

arms over their shoulders, making a sort of purring and cooing noise, and playing with them. When the male scents danger, he drums softly on his cheeks with his hands, opening his mouth. This is the signal for flight

to his family. Then he drums more loudly on his chest, inflating it, and goes to meet the disturber of the peace, whether it be man or beast. He comes on with a sort of hop, emitting a terrible roar. But if he sees that the enemy is stronger than himself, he disappears and hides, with the intention of falling upon his enemy from behind. Though he has enormous strength, he does not rush blindly upon his enemy, but he has recourse, when necessary, to ruse and cunning."

Sokolowsky's report on the conduct of the gorilla in captivity is very interesting. Young animals, from six to eight years old, showed a complete indifference to their surroundings. "They were always retiring and timid, and drew back whenever a man went near them. Their faces always had a marked expression of melancholy and sadness. One saw at once that the creatures could not reconcile themselves to the loss of liberty. There was a look of resignation and of unchangeable repugnance to the approach of man : not only strangers, but even their own keepers." The whole of Sokolowsky's report suggests that in their mental life they differ from man only in degree.

This brief account of the anthropoid apes is indispensable if we are to settle the question of man's relationship to them ; and we could justly say that the settlement of this question is the very heart of the problem of man's origin. When Darwin's theory first spread, it was inevitable that, in view of the mingling of human and animal features in the large apes, they should come to be regarded in the light of ancestors. Darwin himself had spoken very cautiously, and had by no means so positively claimed an "ape ancestor" of man as Haeckel did in Germany. Huxley, who helped Darwin in his anatomical problems, had, in his famous *Man's Place in Nature*, merely pointed out the close relationship of man and the anthropoid apes, and shown that the gulf between the lower monkeys and these apes was in many respects greater than the gulf between them and man.

Huxley went on to emphasise the fact that some of the anthropoid apes are nearer to man in certain features and others in other features. The question was, therefore: Does, or does not, man come from such forms as the anthropoid apes? Are, or are not, those features in which the apes differ from man ancestral features? It is only in recent years that we have been able to get the material to study these questions properly. The facts by which we have, in the preceding chapters, determined man's relation to the other mammals, also enable us to say what is primitive or otherwise in the anthropoid apes. We see, for instance, that the prehensile foot of the apes is a survival of the original condition, and that the conversion of the foot in man's case into a mere supporting mechanism is a change which implies a series of ancestors corresponding to the anthropoid apes. We find, further, that the gorilla alone has retained the "hand-foot," as one may call it. In all the others, especially the orang (remember the missing nail on the first toe), there has been a good deal of modification and degeneration. In other respects also, such as the hairy coat, the anthropoid apes fall into line with man's ancestors. But this is not true of other features.

Even the inexpert can see that the enormously long arms are not ancestral characters for man when he remembers that we agree rather with the monkeys and lemurs in the proportions of our limbs, and that these long arms are peculiar to the large apes. Why they have such arms, it is not difficult to explain. We have seen that they all live in the forest, and that their hands have been modified on account of their peculiar method of climbing, the thumb degenerating and the other fingers growing long and clutching. Here again the gorilla has best preserved the original, and therefore most man-like, condition. In the new-born human infant the arms and legs are about the same length. That is the common starting point of all the mammals,

including the Primates, but the anthropoid apes have diverged from it. As the differences between their limbs show, the modifications have occurred independently, so that the resemblance to each other is only external. The same may be said of the teeth. The study of the skull shows that the canines were enlarged separately in the various forms. As we have already said, the gibbon is the least removed, in this respect, from the primitive condition; though the chimpanzee also keeps the original rounding of the skull in the adult stage. In the orang, however, and still more in the gorilla, the growth of the canines in the male entails a modification of the skull and the entire body, so that it loses a good deal of the "man-like" appearance which is present in the young and the females. The canines keep the root-cavity open until a relatively advanced age so that they can continue to grow; in man this ceases when the permanent teeth appear. Large canines entail large jaws and powerful muscles. These masticating muscles, which are attached to the side of the skull, creep steadily higher, and, as they require a larger surface of attachment, the bone of the skull rises in ridges on the top and at the back of the head.

In the main, this process is the same in the orang and the gorilla, but a careful study of the skull shows us that the muscles are attached at different points in the two cases: more in the rear in the case of the gorilla, more forward in the orang. This means that the skulls of the two apes already differed considerably from each other when the development began. The orang must have had the frontal region more rounded than it was in the gorilla. Hence, again, the ridges over the eyes have developed quite differently in the two cases. In the orang they seem to be stuck on to the rest of the skull: in the gorilla they grow into large parts which depend upon the hind portion of the top of the skull.

The growth of the brain is hampered by the demands upon the skull of these powerful mandibular muscles.

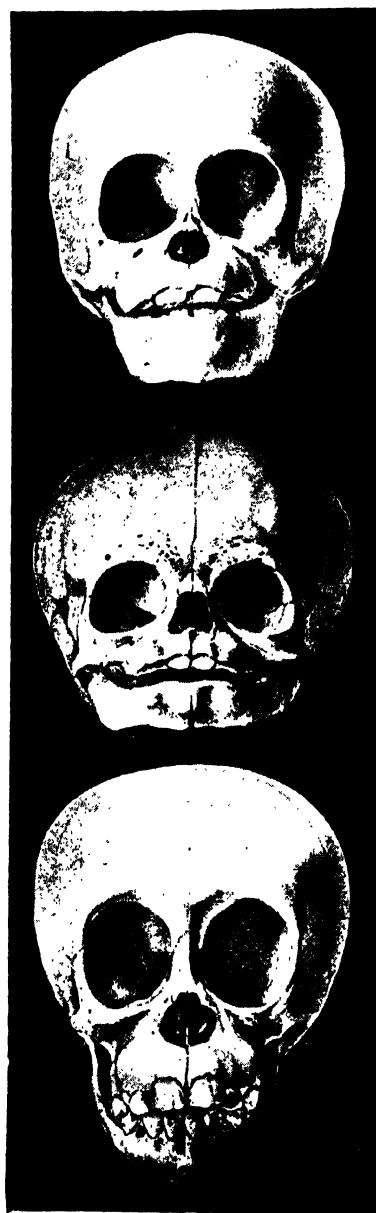


FIG. 31.—SKULL OF YOUNG ORANG
(top), HUMAN EMBRYO (centre), AND
YOUNG CHIMPANZEE. (SELENKA.)

We may say that the adult oranges and gorillas are much inferior to the young in this respect, as the brain of the young develops along a line corresponding to that of the human brain. If it were not interrupted, they would reach the human stage.

We quite certainly have here an obstacle which cut off the anthropoid apes from the path taken by men. Their ancestors were, as we know from the fossil remains, more man-like than the living apes are. We have only to imagine the arms shorter, the legs longer, the canines smaller, and the skull finely rounded as it is in the young, and we have a picture of creatures that differ from man only in one important feature, the structure of the foot. As it is the conversion of this into a supporting mechanism that is the most important point in connection with man's origin, we are in a position to say at what stage the division into men and man-like apes took place. The common ancestors must obviously have been exposed to different environments: in some cases entailing a lengthening of the arms and shortening of the legs, in other cases requiring that the hind limbs should be strengthened.

It is clearly a question of differences in method of locomotion and posture of the body. And since, as we have seen, *climbing* was the original method of locomotion for all the Primates, we have to inquire whether differences in the mechanism of climbing will enable us to understand the differences in general organisation. As a matter of fact, this is so. We have already repeatedly pointed out that the apes live in forests. Their long arms are obvious adaptations to climbing the trees. The atrophy of the thumb is a consequence of their habit of swinging from branch to branch, in which the other four fingers are most active.

We can definitely say that the forms which were to become men had not this method of climbing. If the thumb had degenerated, it would never have recovered.

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And as the human proportions are the original, we come to the conclusion that the ancestors of the anthropoid apes must have retreated into the forest, and that this was done several times independently. In this way their fate was sealed.

On the other hand, we can see that quite different factors are required to explain the evolution of man's limbs. Here again, however, it is a climbing mechanism that governs the development, partly retaining the original features (in the hand), partly creating new features (in the foot) which were of great importance to the general attitude of the body.

The upright posture of man is one of those features without which we can scarcely imagine him. But the question when it was developed is not easy to answer. As long as his ancestors were supposed to be "quadrupeds," it was bound to be a hopeless puzzle how an upright animal could be evolved from an animal running on all fours. No amount of training would teach a dog to go *always* on its hind legs. But now that we know that the starting point was a climbing posture, such as we find in many of the earlier reptiles, the birds, and many of the mammals (the kangaroo, etc.), the explanation is easier. It is a question of shifting the centre of gravity of the body backward and of the capacity of the lower limbs to support the trunk and head. As the human foot seems to be created for this purpose, we quite understand people saying that it was evolved in order to support the body erect. But it is not correct, because we have not to suppose that there was an attempt to gain the erect attitude, but must indicate a mechanical factor that could convert the prehensile foot into a supporting foot. When we compare the two from the purely anatomical point of view, we see that the chief difference is in the big toe. We have already seen that even in the human case this was originally a thumb; and it approaches the thumb in many races to-day.

Dr. K. E. Jung who was an inspector of schools in South Australia and knew the aborigines well, says : " In making a spear they use the foot as a work-table, holding the piece of wood with the toes better than most people could hold it with the fingers. This prehensile quality of their toes is also very useful in climbing high and stout trees. In surprise attacks they keep their



FIG. 32.—AUSTRALIAN CLIMBING A TREE.

spears in the grass, holding them with their toes ; and they are very clever at stealing small articles with their toes, lifting them behind their back to their hand. When they are riding, they do not put their foot in the stirrup, but grasp it firmly between the first two toes. The women also make an extraordinary use of the toes in making nets."¹ The natives of Annam also climb trees with

¹ *Der Weltteil Australien* (1882), vol. i, p. 84.

hands and feet, as the Australians do (Fig. 32), and clutch the stirrup with their toes in riding. The Japanese, Baelz says, "make an extraordinary use of the big toe." They can move it independently, and pick up even small objects with it and the next toe. Women sew with their toes, and it is even said that they can pinch with them. The big toe is so movable in the case of the Japanese that the stocking has a special part made for it.¹ Wiedersheim draws attention to the fact that before the child can walk or stand, "the sole of the foot is, in its outline and certain wrinkles, much more like the palm of the hand than it will be later, when it has been modified by wearing shoes."

We have, therefore, to find some reason why the big toe has moved into line with the other toes, and lost its opposability, and why it has become so much weaker.

It is not difficult to discover a climbing mechanism to suit our purpose—the capacity for climbing thick trees which is so common amongst the lower races. They do not need a prehensile foot in this. There is nothing for it to grasp. The foot is just applied to the trunk as a whole and used to push the body upward. This is easiest in the case of trees like the coco-nut palm, which have natural notches in the trunk. The feet are placed in the notches, and an outstanding big toe would only be a hindrance to climbing. It is better for the foot to have a strong big toe in line with the others.

Amongst the lower races we find a common practice of cutting notches in the trunk and inserting the ball of the big toe in these. Large, wedge-shaped stones were, I believe, used for this purpose in early times; and they are still used. Any man who has seen natives climbing can easily realise what an important part the inner edge of the foot plays in pushing the body up. The skill is even greater when smooth trunks are climbed without artificial notches, as we see the Australians doing. A flexible branch is looped like a rope round the

¹ Baelz, *Die körperlichen Eigenschaften der Japaner* (1883).

trunk, and the native holds the sling in his hands, and places it higher and higher as he goes up.

This climbing mechanism was the rule amongst the primitive man-like apes, or ape-men, as we may call the common ancestor of the two groups; the sort of forest life we described above, in the case of the apes, was an exception. The Primates always lived in trees; they were the hunting ground for small animals and nests, and they served as homes and refuges. As we find adaptations of the mechanism of locomotion amongst all the mammals, in conjunction with hereditary modifications we have a right to suppose in the case of the primitive Primates that the human foot first appeared as a "spontaneous" structure. Individuals which had this accidental variation were particularly fitted for the erect posture. Of the apes the gorilla is nearest to this condition. The gibbon also can walk erect, using its hands for balancing purposes. There is not much lacking in these forms to enable them to attain the human posture. When we compare the chief groups of muscles in the apes and man, we find that in man some are very strongly developed which are unimportant in the apes. These are the muscles of the shoulders and the buttocks; and it is precisely these which are used in man's method of climbing, either to draw or push the body upward. And it is the same muscles that are mainly concerned in keeping the body upright and drawing the shoulders back so as to give freedom of movement to the head. Man's whole extraordinary power of gymnastic exercises, in which no other animal approaches him, is easily understood in the light of this early tree-climbing. Man is unquestionably far more versatile than the apes.

Once the power to keep the body upright had been acquired, it led to further modifications of the skeleton—the limbs, pelvis, and vertebral column. Within the human family to-day we can follow the course of this development, as contrasted with the older state of things,

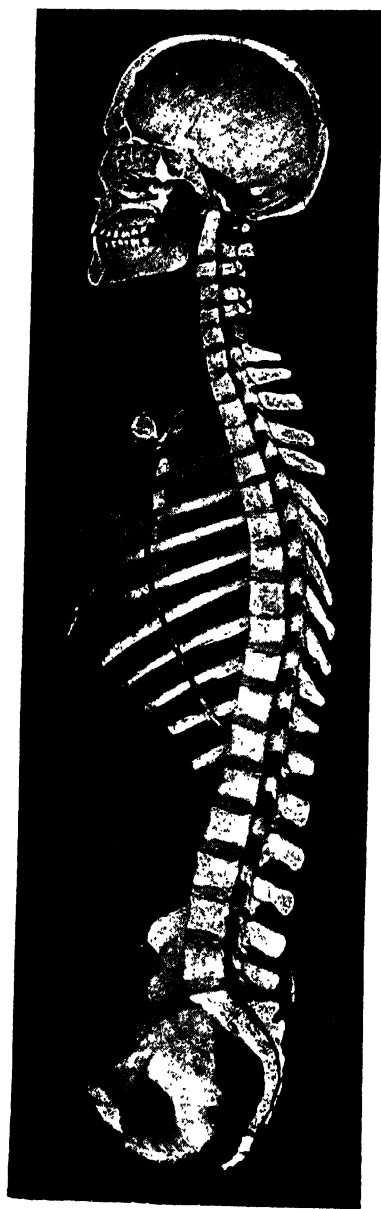


FIG. 33.—THE SPINAL COLUMN
AND TAIL.

which points to a common origin with the apes. But amongst the lower races we never find an approximation to the apes in regard to the proportions of the body (Fig. 29). Many of the lower races have fairly long arms, but they then also have long legs. All races, living or fossil, have the human proportions of the limbs. Moreover, we never find approximations to the canines of the apes amongst human races. This negative position must be regarded as a proof of our thesis. If the older theory, that man was evolved from an ape, were right, the lowest living races or the fossil human remains we have would show larger canines than the men of civilised races. This is not at all the case. Though their teeth as a whole are large, the Australians have a quite human dentition; and the oldest prehistoric remains we have found, such as the famous lower jaw discovered at Mauer in 1907 in early diluvial deposits, have not outstanding canines.

These facts are the more important as in other points of organisation there are clear approximations of certain human types to the anthropoid apes. The thesis of Huxley which we gave above, and which he himself could not explain, is now intelligible, as we know that the western anthropoids are nearer to certain human types and the eastern anthropoids to others. Apart from the proportions of the limbs, there are several purely morphological special features of the bones in which there are remarkable approximations between the gorilla and the Neanderthal race. We shall deal with this race later, and will only observe here that the gorilla is clearly derived from a type that was not far removed from it. There are, further, close affinities both of the gorilla and Neanderthal man to a large number of the living African blacks, while other African natives show an affinity to the ancestors of the chimpanzee. The oranges, on the other hand, are clearly the last links of a long chain of ancestors the earlier representatives of which

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were related to certain Asiatic races and to the prehistoric Aurignac race of Europe, with which we will deal later. They came to Europe from the East, as the old idea of an "Indo-Germanic" race, or Huxley's idea of an "Austral-Caucasian" race, had assumed. To this group belong the older peoples of India, the Australians, the Polynesians, and the Malays. The Mongoloids are



FIG. 34.—AN AUSTRALIAN BABY, IN APE-LIKE ATTITUDE.

probably an offshoot from the group. The physical differences between the eastern and western types of apes and men were until lately detected only in the skeleton, but they have now been extended to the cerebrum.

We may not be prepared to go so far as to trace the human race to two or more different roots, but we cannot deny that the recent tendency of anthropology is not

to support the idea of the unity of the race that had been suggested by religious and sentimental considerations. Modern science cannot confirm the exaggerated humanitarianism which sees brothers and sisters in all the lower races. The various types must be taken separately. The Australian aboriginals, the Samoans, and the Cinghalese are certainly closely related to us, but a Zulu or a Herero is not.

That all have a common ultimate origin cannot be questioned—but it is very remote—as remote as the separation of the apes and man. We can say very little in the present state of science about the home of the



FIG. 35.—JAW FOUND AT MAUER (HEIDELBERG MAN) IN 1907.

common ancestor. The distribution of the living forms, however, clearly points to some region which must have had connections with both Africa, Australia, and Asia. There is a good deal to be said, especially as regards the eastern group, for the Malay Archipelago. When we remember the difficulty of expansion, the actual region of the orang and gibbon is significant. The grouping of the whole of the anthropoid apes and the races of men round the district of the Indian Ocean suggests that a continent on which the primitive ape-men lived has foundered in that region; indeed Dr. Russel Wallace showed decades ago that there were clear traces of such

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a lost continent, and the idea is generally received, though it is disputed if this was the cradle of the race.

From such a centre it would be possible to reach Australia, the aborigines of which are a stationary remnant of primitive humanity. Here, also, were found the famous fossil bones of the *Pithecanthropus* (Ape-Man): a skull-cap (Fig. 36), two teeth, and a thigh bone found by the Dutch military surgeon Dubois in the volcanic sands of Java in 1894. Beyond question this skull is

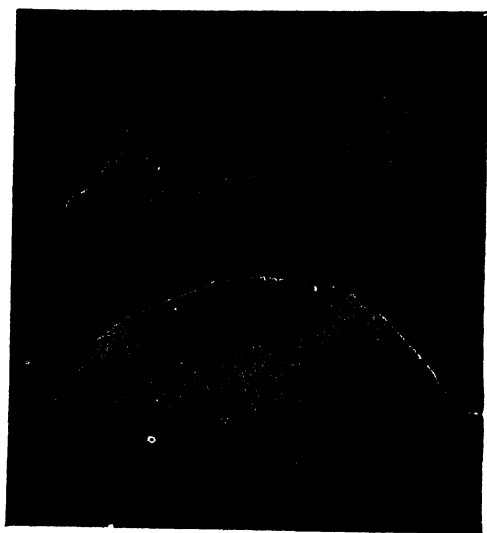


FIG. 36.—SKULL-CAP OF JAVA MAN AND NEANDERTHAL MAN.

not far removed from the primitive type of skull of early man and the anthropoid apes. Dr. Smith Woodward has suggested that the Java remains may represent a large and exceptional gibbon, but the cranial capacity is enormously larger than that of any known ape; it is, in fact, half-way between the best known ape skull and the lowest known human skull. It is generally recognised that we have here the bones of an Ape-Man, probably an offshoot of the early stock not in the line of ancestry

of later races. Gustav Schwalbe, the leading German authority, has recently (1921) made a close study of the Java remains, and has come to this conclusion. On the other hand, the Swedish anthropologist Ramström has recently contended that the skull-cap is that of a chimpanzee: which can hardly be reconciled with

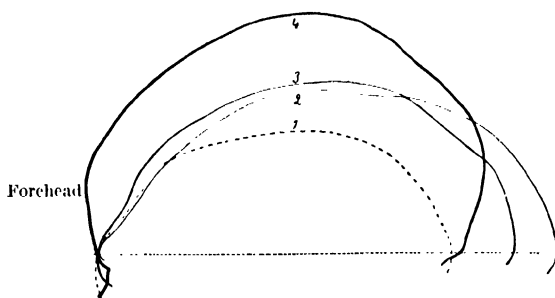


FIG. 37.—OUTLINE OF THE SKULL OF A CHIMPANZEE (1), THE JAVA MAN (2), NEANDERTHAL MAN (3), AND A MODERN EUROPEAN (4).

its large cranial capacity. Dubois has recently (1921) announced that two further skulls found in Java in 1889 and 1890 have proved to be those of "Proto-Australians" of the Pleistocene Period.¹

¹ "The Proto-Australian Man of Wadjak, Java," in *Proc. of the Royal Academy of Amsterdam* (vol. xxiii, part 7). Dr. Heilborn finds these remains closely related to the Aurignac race of Europe.

CHAPTER IV

THE USE OF FIRE AND WEAPONS

WE have now reached that stage in man's evolution when he emerged from purely natural conditions and began to show the rudiments of some sort of "culture." This is the stage at which we parted company from the apes, which must now be regarded as abortive attempts at human evolution. They are humble relatives of ours who have retired into the protecting shade of the forests. Complete separation would not take place until sexual intercourse entirely ceased between the ape type and human type; and, in view of the pronounced sexual life of all the Primates, this may have taken a long time. Once they were separated, and, in spite of the relationship, the groups became hostile to each other, there was nothing left for the apes but to continue in the wild state; and, indeed, they were condemned to this by the loss or the degeneration, in various degrees, of the thumb.

If it is now asked whether there is any special cultural acquirement which helps us to understand the broadening of the gulf between the two groups, we can point to one of the earliest attainments of our ancestors—the use of *fire*. There is no human group, however lowly, that is unable to enjoy the blessings of fire. The natives of Tierra del Fuego, at the tip of South America, are amongst the most backward races. But the very name ("Land of Fire") indicates that they use fire. It was given to the island by the mariners of the sixteenth century on account of the large number of fires they found lit alone

the coast. We find the same thing to-day on the desert coast of Australia.

On the other hand, there is no animal—not even an ape—that makes use of fire. It is true that many of them appreciate the warmth of fires. It is said that baboons warm themselves at deserted camp fires until they go out. The anthropoid apes do not need fire in the hot-house climate of their forests, but, on the other hand, they are helpless outside their own environment. They generally die of consumption in a colder climate, in spite of every care. By the discovery of the use of fire primitive man was able to pass from one region to another. The production of fire was the first step toward independence of external conditions and mastery of the forces of nature.

The imagination of early man was much occupied with this mysterious gift of fire, and, as in the legend of Prometheus, it was sometimes ascribed to the gods. On the scientific side, also, there has been a tendency to regard the discovery of the use of fire as relatively late, and to connect it with the Ice Age. But the Ice Age had nothing to do with the *origin* of the human race. There were men in places far away from Europe before the Ice Age. If cold is regarded as the decisive factor, we need not appeal to the Ice Age. Even in the tropics the nights are sometimes very cold. It is doubtful whether in this case the desire—the craving for a remedy for cold—led to the discovery. The Fuegians live naked in a very raw climate. They have no clothing, which would be of great service against the cold.

To understand the matter fully, we must realise that it is not a question of a discovery at one particular time or place, but of three distinct stages : (1) a knowledge of fire in general, (2) the ability to keep a fire going, (3) the ability to make a fire.

The first thing was that man learned the injurious and the useful action of fire. Where this occurred we

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do not know, but we can suggest certain possibilities or probabilities. The regions to which we pointed as the possible cradle of the race, such as the Malay Archipelago, are still rich in volcanic phenomena. It is, therefore, possible that man made the acquaintance of fire through volcanoes. Lava streams are well calculated to impress inquisitive creatures with the nature of fire. In the case of the Australian aborigines we find that long extinct volcanoes play a great part in their imaginative life; and it is clear that volcanic outbreaks would make a deep impression on the mind of primitive man.

As is well known, however, fire can be made by rubbing

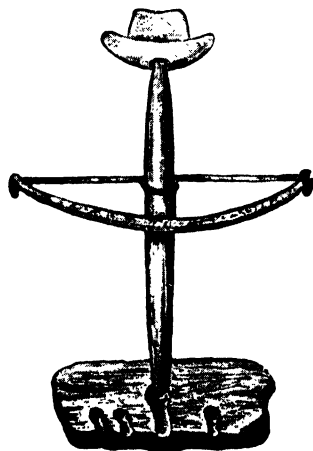


FIG. 38.—A FIRE BORER.

dry pieces of wood together. A forest on fire in a hot summer is not uncommon in Europe; in Australia it is a very common phenomenon. The terrors of such a fire may have made just as deep an impression as volcanic eruptions upon the mind of primitive man. Then there is lightning. There were plenty of opportunities to learn the nature of fire. The great thing was that there was a human brain to learn it.¹

¹ Klaatsch's statement, on good earlier authority, that forests catch fire by branches rubbing together, is now accepted. As to the firing of

How indispensable fire was to primitive man we can learn to-day from the Australian aboriginals. They are never without fire, as they carry smouldering wood with them on their journeys. They think it impossible to sleep without a fire. It is not so much a question of the warmth as the brightness of the fire, which keeps away evil spirits. Fire must have won its way into the heart of man as a beneficent element quite early in his history.

The desire to keep a fire alive was the second step. The sacred fire tended by the Vestal Virgins at Rome shows how long the recollection of this stage lingered in the memory of man. It is a relic of the days when the making of fire was difficult, and a common fire was kept up for the village. A gift of fire seems to have been in early times one of the signs of welcome. The aboriginals of Tasmania met the first Europeans who landed on their shores with burning sticks.

The ability to make fire at any time was a most important advance. There are many ways of doing this, and no doubt they were discovered independently in various parts of the earth. Rubbing two pieces of wood together is the simplest and most widespread. The sacred fire drill of the Indians, a symbol of the solar disk—we have it also in the Buddhist *swastika*—is much the same as the simple borer used by the Australian aboriginals to-day. A small hole is made in a flat round piece of wood, and a stick with a rounded end is inserted in it. By twirling the stick rapidly sawdust is rubbed off and is heated; and, as soon as smoke rises from it, they blow it into flame. We find this apparatus in all sorts of forms all over the world. Sometimes a cord is attached to the boring stick (Fig. 38) for greater speed. The North

forests by lightning and the terrible results, see K. von den Steinen, *Unter den Naturvölkern Zentralbrasiliens* (1894). Steinen suggests that man discovered how to make fire by noticing the heat and smouldering of the sawdust he scraped off wood in working it with his primitive stones, shells, etc. From this he went on to boring. [Heilborn.]

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American Indians had some very complicated forms of this.

The principle of the "fire saw," which we find in the Malay Archipelago and North West Australia, is the same. A split block of wood takes the place of the fire hole. The split is filled with tinder and held open by a piece of wood. Another stick is used to saw vigorously over the split, and the tinder is enkindled.

Whether sparks from iron pyrites were used in the earlier Stone Age we do not know. It is quite possible that the Europeans of the Ice Age may have discovered this in trying to make weapons out of iron ore (chipping it with flints), which they would take to be a hard stone.

However that may be, the consequences of the discovery in the culture of prehistoric man were most important and manifold. Physically, it is probable that the constant practice of sleeping near fires had something to do with the loss of the hairy coat. We do not know the causes of this modification, but it is plausible to grant some influence to fire when we remember that the apes have retained the hair, and that animals have it increased when they live in a cold climate. Men differ considerably in this respect. Europeans, Australians, and the Aino are the most "hairy" races, while Malays and Mongoloids show the opposite extreme. The problem of the loss of the hair is not easy to solve. Taste and sexual selection have a good deal to do with the matter. They are especially responsible for the growth of the pubic hair, which is wanting in the animals which are nearest to man. The growth of hair in the arm-pits is a hopeless puzzle. Not a single plausible explanation of it has yet been suggested.

In the next place, the discovery of fire had a very important influence on man's preparation of his food. Dr. Otto Hauser,¹ in his account of his discoveries in France, says that he found the first traces of the use of

¹ *La Micoque, die Kultur einer neuen Diluvialrasse* (1916).

fire in the Acheulean period. Burnt bones of the bison were found with the remains of the Acheulean man of La Moustier—with whom we deal later—and there were cinders and ashes. The fire was on the open ground just before the entrance to the cave. This lasted throughout the supremacy of the Neanderthal race, in the Acheulean and Mousterian periods. In the next, or Aurignacian period, we find round fire-places built up with flints, which show the effects of the fire. This lasted through the Magdalenian period, but in the Solutrean period we find that the fire was between two layers of stone. Dr. Hauser conjectures that this type of fire-place, which was not common, served for the more or less sacred permanent fire; though it was clearly used for cooking. Animals were roasted on the upper layer of stones.

From his teeth man is naturally omnivorous, with a certain amount of bias for vegetable food. The anthropoid apes are almost entirely vegetarian, in spite of their large canine teeth, which have nothing to do with their food. They are weapons, chiefly used by the males in fighting for the females. Isolation has only made them more combative in this respect. It is true that the apes occasionally eat eggs and small birds, but man developed a decided preference for animal food. He became a hunter, and this led to a development of his powers which has had no small influence on his mental and cultural evolution. Physically he was well equipped for this kind of diet. The excellence of his eyes enabled him to see animals at a great distance, and the skill in climbing which his foot and powerful muscles gave him greatly extended his horizon. His thumb again, enabled him to throw stones, to break off branches of trees, and, in the end, to make weapons out of wood by means of sharp stones and shells.

The next step was the impulse to concentrate all these faculties on exploiting his fellow-creatures. This was the reawakening in man of the spirit of the carnivore,

to which he was always disposed, as the carnivores themselves had come from Primatoid ancestors. But in the human brain this idea of feeding on animals related to himself took a refined and complicated form such as no real carnivore was capable of,

The first members of the primitive human herd to put into practice the idea of laying hold of mammals, or killing them by means of stones, had an easy task. We

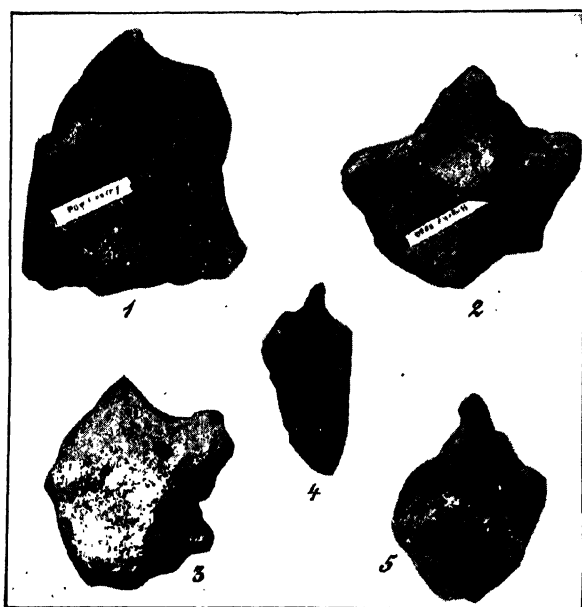


FIG. 39.—EOLITHS.

gather this from the well-known fact that animals only learn by experience to fear an enemy. In places which are not visited by men the animals are still without fear, as Antarctic explorers report of the penguins. Even seals go inquisitively up to the hunter. In uninhabited districts birds will settle on the sportsman's rifle; whereas our crows have learned so much that they keep out of rifle range. Inquisitiveness is a common feature of animals. Cuttle fishes are caught by means

of mirrors, lizards by means of a grass-stalk, the knots on which are made iridescent by spittle.

This curiosity was fatal to the first animals that man set out to kill. He must have been able to seize many of his victims with his hand. Even in places where the animals had suffered from carnivores, man could approach them easily, as they had no reason to fear him. It must have been a great time for the primitive human herds when they could make what havoc they liked amongst the other animals. The simplest means would suffice. Up to the present it has not been sufficiently noticed how well this idea enables us to understand the rapid spread over the world of the early human groups. When the primitive hunters had exhausted a region—that is to say, when the animals began to recognize the newcomer as a destroyer—they had only to move to another district and continue their murderous work; and in the end this meant a spread of the race over the whole earth.

The artificial means used for hunting in this golden age were very slight. Stones picked off the ground were enough for killing. The bodies were cut up with sharp splinters and sections of stone, such as we find in nature. The blood was drunk, and the brain picked out of the skull. The Australian of to-day throws his kangaroo on a fire until the gases fill its belly. It is ripped open, and the contents are swallowed much as a Neapolitan swallows his macaroni. The flesh is cut up with sharp pieces of stone and eaten, and the bones are broken open to extract the marrow. For these purposes the black does not require any special stone implements. He uses the simplest splinters, knives, scrapers, borers, etc., and it is easier to tell from the marks of use on them than from their form that they were once in a human hand. They are “Eoliths,” like the instruments which have raised so much discussion in Europe. It is the simplicity and apparently very slow formation of these instruments that have given rise to doubts. But the

fact is quite natural. Such tools were all that was required for a long time, and they were still used after better implements were made.

It was only when the population increased, and the animals learned to regard man as a worse enemy than the carnivores, that the primitive hunter had to improve his weapons. He invented weapons that he could throw, which were more effective. The oldest form of these is the club: a long wooden stick, polished with a sharp stone or a shell, rough at the end which is held in the hand, so that it will not easily slip out. Many different forms were developed out of this. It was important to keep the hand part distinct from the shaft, especially when it was used for striking instead of throwing. When it is flattened, it makes a sort of wooden sword, such as we still find in many places. In some parts of Australia, in fact, very large wooden swords of this sort are still used in duels.

Another development of the club is the boomerang of the Australians. The word "boomerang," picked up by the English colonists, is really the name of a different weapon altogether. In the whole of West Australia the natives use a word which means "wedge." There has been a good deal of discussion as to how the Australian aboriginal invented so clever an implement as the boomerang, which comes back to the thrower if it hits nothing. As a matter of fact, it is not peculiar to Australia. We now have proof that it was well known in primitive times and widely spread.

The peculiarity of the "wedge" is that as soon as it is thrown it begins to turn round, and it goes in a spiral until the resistance of the atmosphere stops it. The chief point of it is not that it returns to the thrower, but its tremendous striking force and the fact that the curve of its path makes it difficult for the victim to escape. Most of the Australian "wedges" do not return; they are simply heavy weapons for fighting purposes. Those

that are specially made so that they return are only used for sport. Amongst the relics of the first population of Denmark in the New Stone Age (about 6000 B.C.) we found wooden throwing clubs something like boomerangs. Egyptian wall-paintings represent soldiers with boomerangs, and wooden boomerangs have been found



FIG. 40.—THE BOOMERANG.

in the tombs. There are similar instruments, generally of metal, in many parts of Africa and Asia. We are, therefore, justified in regarding it as a very ancient implement. We may recall, also, that in old Teutonic mythology the hammer of Thor was supposed to have the power of returning to the god.

In an article on "The Natural History of the Races

of Men" (*Politisch-anthropologische Revue*, ix, 10) Dr. Melchers points out that the lower jaw of an animal, a heavy and durable bone, would make a very good missile, and "may have been the primitive model of the wooden boomerang." It is a very plausible suggestion. The weapon is often mentioned in ancient writers. Isidorus of Seville in his *Origines* describes, under the title "Catcia" (Catagia?), "a Gallic throwing club which returns to the thrower when it is launched by a skilled man." The Anglo-Saxon bishop Aelfric (†1006) calls a club of this sort "Teutonic" and even Virgil (*Aeneid*, vii, 741) says: "They used to throw their clubs in the German fashion." It is clear that he refers to a boomerang, as it was a common weapon of the Gauls and Germans.

Jung tells us that the boomerang has many forms and many names (keili, wonguin, barngit, etc.) in different parts of the Australian continent, and he adds: "The path of the weapon varies according to the skill, and even the intention, of the thrower. It describes a circle the farthest point of which is sometimes 170 yards (?) from the thrower. This point is also the highest point of the circle in which the weapon swiftly travels, its flat surface to the earth and rotating all the time. But the boomerang may also be so thrown that, instead of rolling along the ground like a hoop, it whizzes suddenly up into the air, describes a wide arc, and returns to the thrower. It may fall at his side or his feet, or it may go far behind him and strike an unsuspecting enemy or animal. A skilful native can make it describe two, or even three, circles in the air instead of one, and can make it execute a number of peculiar movements over his head when it returns before, after whizzing uncomfortably close to him, it starts on a second journey."¹

The spear is another weapon of the early hunter.

¹ See also Sarg, *Die Australischen Bumerangs* (1911).

Originally a simple stick, its end pointed with a stone and hardened by fire, it in time was provided with a stone or bone head, as we still find in Australia. Later, again, a wooden spear-thrower was invented. The Australians call this a "womera" (from *mera*=hand), and it is really this name which has degenerated into "boomerang." A piece of wood jutting out at the end of it fits into a hole at the bottom of the spear, and this enables a man to throw the spear with greater force. It is an ancient invention,



FIG. 41.—AUSTRALIANS THROWING SPEARS.

as we find it, not only amongst the Australians and other lower races (Eskimo, Brazilian tribes, etc.), but also amongst relics of the Old Stone Age.

(The bow is a sort of substitute for this in a later stage of development. An arrow is only a small spear. The origin of the bow is unknown, but it was a distinct advance. It is not found in Australia, and was not known in the Old Stone Age.)

In recent years Breuil and Obermaier, the heads of the Institut de Paléontologie Humaine founded at

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Paris by Prince Albert of Monaco, [have found rock paintings of hunters with bows and arrows in a grotto at Alpera in south-eastern Spain, called the "Cueva de la Vieja." The paintings on the wall of this cavern belong to the Magdalenian period—the last part of the Old Stone Age in Europe. In the account of their discovery (*L'Anthropologie*, vol. xxiii, p. 1 and fol.) 'they say: "The men are, apart from rings on the ankles and at the knees, quite naked, though they have some sort of head-gear, or ornament. Two of them, whose heads are drawn in profile, have regular feather head-dresses, like Red Indians. Sixteen of them are drawing their bows

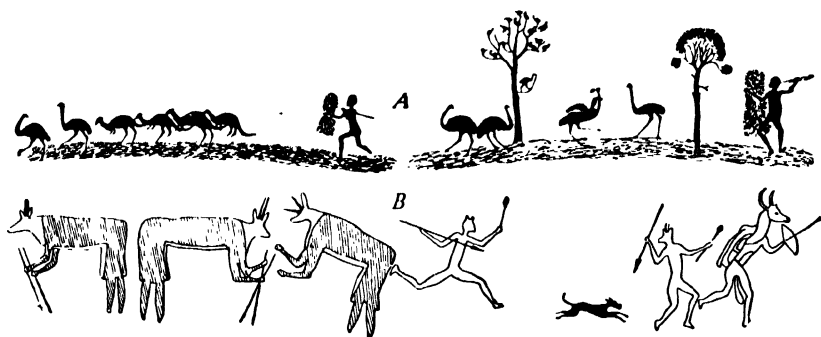


FIG. 42.—AUSTRALIAN (A) AND BUSHMAN (B) DRAWINGS. (PARKER AND ORPEN)

at animals. Nine of them have the bow, and a bundle of arrows under their arms, as well as javelins. One can see the feathering of the arrows and the long barbs at the point quite clearly."

Thus the bow and arrow were well known to the men of the Great Ice Age. What is still more astonishing to ethnologists is that, if the shooting is drawn correctly, the bow was "compound"—a very complicated form, which in all our experience of savage tribes is the last term of a long evolution of the bow. The "feathering" also—which we do not find among low tribes—is remarkable, and points to a long acquaintance with the bow and arrow, of which we have no trace. Is it possible that

the Alpera drawings belong to a later date than was supposed?¹

From the bow other weapons, such as the cross-bow, were developed in the course of time. Amongst some of the Malay tribes and in other places we find blow-pipes for shooting arrows at an animal or an enemy.)

Defensive weapons have their origin in weapons of attack. It is very interesting to follow the evolution of the shield. It was originally a club—a round club with a handle in the middle, a sort of club-shield. Broadening this out, the Australians get the long shield with the handle cut out of the same piece as the shield. Later

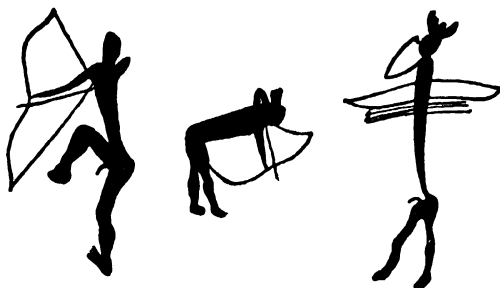


FIG. 43.—PREHISTORIC DRAWING OF ARCHERS.
(BREUIL AND OBERMAIER.)

a special handle is attached. All the types of metal weapons that we find are modelled upon wooden weapons such as we still find in Australia and other countries.

More important than the improvement of the weapons was the education of man's mind, which kept on inventing new ways of surprising his wary prey. He began to use craft, a new method of fighting either animals or fellow-men. The ruses are as inexhaustible as the mind itself. One of the simplest is to approach the victim stealthily.

¹ In my *Allgemeine Völkerkunde* I have suggested a theory of the origin of the bow and arrow which appealed to Klaatsch. Primitive man would easily discover the elasticity of wood in bending twigs, and bits of bark hanging down from such a twig, when he was stripping one, may have suggested the cord. [Heilborn.]

124 THE USE OF FIRE AND WEAPONS

When an Australian is stalking a kangaroo, he stands as motionless as stone the moment the animal notices him. The dark shade of his skin is a good protective colouring in the shadows of the bush, and he may conceal himself further by branches of trees and foliage.

Fire also was pressed into service. Burning sticks were used to keep the game on the move, and they were left only one outlet, at which hunters were stationed. Torches were also used to drive the animals over precipices. Possibly man learned from beasts like the hyena this trick of driving his victims over steep places.

A further step was to dig pits, covered with some material, into which animals would fall when they came to drink. Pits of this kind have been found amongst the Palcolithic remains of southern France. Dr. Hauser found a score of them near Laugerie Haute in 1907. They were crater-shaped depressions cut out of the chalk, at regular distances from each other, covering a space about sixty yards long and twelve wide. There was a Solutrean colony close by, and Solutrean implements were found in the pits. The larger pits were five feet deep and seven feet in diameter at the top. Everything indicated that they were pits, like those used by the Australians and the Hottentots, for catching wild animals.

Larger animals were surprised in their sleep. Their eyes were dug out, or their sinews cut. The most remarkable method, however, is when the hunter imitates his prey: possibly a very old method, as it depends upon the confidence of the animals. The hunter clothes himself in the skin of an animal similar to that which he is stalking. Rock-paintings of the Bushmen represent this kind of hunting. The bear skin was used by the ancient Teutons for the same purpose, and the lower jaw, with its powerful canines, may have served as a weapon.

This, in turn, led to further developments. Sometimes the skins had to be carefully prepared. On the other

hand, the ways of the animals had to be closely studied, and some of these—the nocturnal dances, for instance—were imitated and helped man's growing feeling for amusement. Then there was the impulse to draw the animals, which had much to do with the dawn of art.

Hunting was not the only source of food. All sorts of small creatures were eaten; as we find the Australians to-day eating snakes and lizards, and even ants and other insects. Amongst the Australians "small game" of this sort is left to the women and children, who have also to collect fruit, roots, etc. Even the savage can prepare an enormous variety of dishes from these things. Tough roots are kneaded into a kind of cake; and the Australian makes a sourish drink by crushing ant-larvæ in water. Honey must have been one of the earliest delicacies; perhaps, as in Australia, the honey given by a wild, stingless bee.

In fine, there was plenty of food in the waters. One of the most primitive faculties that man—differently from the apes—preserved was the ability to swim. Lower races which live on the coast lead a sort of amphibious life. They swim out to islands, can remain an extraordinary time under water, and go out to sea a great distance on trunks of trees. The myth of the Tritons probably had its roots in this. A couple of trunks bound together, a raft, such as we find all over the southern seas, was the beginning of navigation. The first ship was a hollowed tree-trunk. The next step was to build a boat with bark. Many natives, like the Australians of the west coast and the Tasmanians, did very little in this way; and it is not less remarkable that fish is not so important an article of diet with some primitive races as one would expect.

In Australia and Tasmania we find great heaps of shells—like the "kitchen middens" of Scandinavia in the New Stone Age—showing that large masses of shell-fish were eaten. In Tasmania we find no fish-remains

in these heaps, and it is said that the old race avoided fish. In Australia, on the other hand, and in many of the Pacific Islands, we find large catching pools on the coast. These are walled ponds with an opening toward the sea. Fish swarm in with the tide, and are left, and easily caught by the natives, when the tide goes out. The spear, also, was used very early in fishing, especially a spear with three or four prongs of bone, such as the Australians of the northern coast use to-day. Neptune's trident is a reminiscence of these early days. Fishing with nets is a later development. In Australia the aborigines also make great feasts on stranded whales, which are often thrown upon their rocky coast.

CHAPTER V

THE DEVELOPMENT OF SPEECH

THE collective action which the hunt required on the part of the members of the primitive tribe must have shown the need of some means of communicating with each other, and so promoted the development of articulate speech. On this point we have as yet only described (in the first chapter) the evolution of the larynx, the organ of the voice, from the gill-arches. This was common to all the mammals, and, from a purely anatomical examination of the system of cartilages and muscles in the larynx, we should expect the other mammals to be as capable as man of making complicated sounds. But it is not simply a question of the play of muscles in the larynx or the widening and contracting of the vocal chords. Certain physiological factors have restricted the power in the animal world generally, while the Primates, and especially man, have retained the primitive condition, and are capable of emitting a large range and variety of sounds.

We must bear in mind that, when we use the word "speech," we have not merely to think of the larynx and the tongue. If we take it broadly to mean the power of communication, there are other means of "speaking," and these are largely used in the animal world. There is speech by means of signals, and in effectiveness and resources it is scarcely behind laryngeal speech. We often hear uninformed people say that the great difference between the animal and man is that man alone has speech. But this only applies to "articulate"

or laryngeal speech—and man has to learn this very laboriously. But the “inarticulate” babbling of the young child also is “speech,” and its lively movements are so many ways of making itself understood. The animal has a similar speech by means of signals, and primitive man certainly had it.

We now know that ants and other insects communicate with each other by means of their antennae. Even amongst the higher animals, however, a close observer will learn much about the different ways of communicating by signs. They are very important in the case of all gregarious animals. Changes in the movement of the ears, for instance, communicate a perception of some

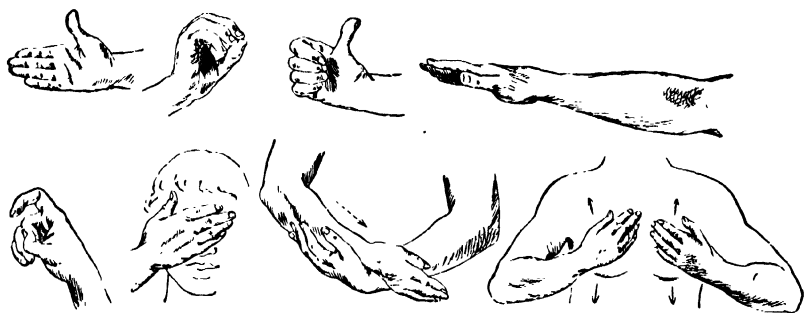


FIG. 44.—FINGER LANGUAGE (NORTH QUEENSLAND). (ROTH.)

danger from one member of the herd to others. The elephant can make a great variety of signals with its trunk and ears. Horses put their nostrils together, and seem to be able to communicate in this way. The wagging of a dog's tail is one of the strangest forms of signal-speech.

We can safely conclude from our observations of the Australian aboriginals, if not from general considerations, that primitive man had a similar speech without words. The hand, once more, proved to be of great importance. Dr. W. E. Roth, formerly protector of the aboriginals in Queensland, discovered and thoroughly studied the Australian manual speech. He came across it in connec-

tion with hunting, when he noticed that two natives at a considerable distance from each other had an understanding about prey. He found that there is an immense variety of finger-movements to indicate different kinds of animals ; in fact, that the particular behaviour of the animal—whether the kangaroo is still or moving, for instance—can be conveyed by the fingers.

No doubt our habit of helping out our words with gesticulations can be traced back to the hand-language of our early ancestors. The habit is very pronounced amongst some of the lower races.

Amongst the Australians and many other races we find another means of understanding each other at a great distance—the use of fire. Smoke-signals give warning to distant tribes of, for instance, the approach of white men, and so on. It is a sort of beginning of telegraphy ; just as savages also have a rudimentary postal system by means of frequent and swift messengers. In certain parts of Africa (the Cameroons) and elsewhere the drum is used for the same purpose. German officials kept a drummer on the boat when they travelled along the rivers to announce the object of the visit to the natives. Every white man has his drummer. The natives learn the art at about the age of twenty ; but women are not taught it. The more swiftly they drum, the better the language is understood.

Speech by signs was particularly developed amongst the American Indians, as their nomadic life and the great variety of languages necessitated some such general means of communication. The signs had the same meaning from Hudson Bay to the Gulf of Mexico, and they were so “natural” that they are found to-day in our deaf and dumb language. For instance, both the Indians and our deaf-mutes express “riding” by making a pair of legs of two fingers of one hand and putting them straddlewise across one finger of the other hand. “Raining” is expressed by drawing down the

finger-tips of the partly closed hand (the rain falling from the clouds): "Fear" by putting the hands on the lower ribs. The Indians had also, like the Australians, a great variety of smoke-signals, much used in their fighting with each other and the whites. Caesar tells us that the Gauls did the same.

Whistling is also used in many places as a means of communication. In the island of Gomera everybody except a few dignitaries can converse at a distance by whistling, and express anything that words can express. They have a special note for every syllable. Natives of the Cameroons sometimes whistle a message instead of drumming it. Frobenius found that his expedition to Togoland was announced in this way to the German official forty miles away! Other tribes in the north of Africa had the same practice, but the Arabs suppressed it.

Even in regard to spoken language, however, there is not a fundamental difference between man and the lower animals. Amongst the fishes we find certain sounds produced with the aid of the swimming bladder; though whether fishes have the sense of hearing is disputed. The croaking of frogs is a relic of a very primitive social noise—as we may properly call it—an early stage of the musical mass-production which we have in the song of birds and the "concerts" of the Primates. We have already spoken of the musical accomplishments of the gibbon; and we must not forget to mention the American howler, the larynx of which is greatly distended.

There is, therefore, nothing new or strange in the primitive group-songs of the Australian aboriginals. We are fairly safe in assuming that it was a common practice of primitive man. Being a social animal, man has always felt the need of herd-sensations and expressions of such. In this he has not changed at the civilised level. The "corroborees," the nocturnal feasts of the Australian tribes, with their monotonous bawling, do not make a

very pleasant musical impression on us ; but to the natives they are something great.

Here we touch a point of much importance in connection with the evolution of articulate speech—the relation of the early stages of it to music. Articulation is rhythm, and the vocally rich languages of the Australians and other peoples have a musical element in them. In the impression they make, they rather remind us of Greek or Italian. The first use of vocal speech would be to express pleasure and displeasure, as it still is amongst the lower mammals. The apparent monotony—of the cat's voice, for instance—suddenly assumes a remarkably rich power of modulation as the feelings, whether pleasant or unpleasant, are intensified. Young animals are curiously richer than old in the variety of the noises they make.

We must assume, therefore, that originally there was a comparatively large range of notes ; and the condition of the Primates is directly connected with this. In the case of the other mammals there has been degeneration, which was generally due to mechanical factors. The modifications of the head, especially of the jaws, which were brought about by the adaptation of teeth and mouth to particular kinds of diet had an influence on the vocal capacity. It is the tongue that is largely responsible for man's great vocal resources. This is due to the great number of movements which it can execute within the cavity of the mouth, according as it touches the teeth or the palate. In the case of the mammals the jaws are thrust out, and the sides drawn together, so that there is less room in the mouth, and the tongue can only move in certain directions. The broad "parabolic" curve which the human jaw describes is assumed here to represent the primitive condition, as opposed to the long and narrow jaw of most of the mammals. We have justified this assumption in showing, as we did, the primitiveness of the human teeth. It is instructive also to compare the parabolical line described by man's lower

jaw with the form of the jaw in the lowest land-vertebrates, such as the living amphibia; there is a remarkable resemblance between them.

On the other hand, in the anthropoid apes we can follow the development of this condition into the "animal" stage. While the young apes are entirely of the human type in this respect, the growth of the canine teeth brings on a condition that reminds us rather of the carnivore. We see the same in monkeys, such as the baboons, which have large canines. There is no doubt, then, that our Primate cousins have been spoiled in their vocal powers. The facts at once confirm this. (The gibbon, the most primitive of all, has the best voice. In the orang we find a degeneration of the muscles which control the opening and closing of the mouth. The anterior part of what is called the double-bellied chin has completely disappeared in the case of the orang; the enormous development of the laryngeal pouches may have something to do with this. Man has rudiments of these pouches underneath his vocal chords, but they can never have been of the size they have in the orang. When the chimpanzee is excited, it gives out a series of rough notes which remind us of certain noises made by the Australians during their corroboree dances. In the case of the gorilla we know only its fighting roar. Unfortunately, as I said, we know very little about the intimate life of this giant ape.

We have already made some progress in mastering the evolution of human speech by realising that in this respect, and so many others, man has preserved primitive features which made it possible, especially in conjunction with a superior brain, to rise yet higher. We must regard the larynx of the majority of the mammals almost as a rudimentary organ, a mechanism that, according to its anatomical structure, is capable of doing far more than it does. The modification of the mouth-cavity which we described in an earlier chapter is *one* factor in

this limitation. The other factor is the imperfect development of the brain. We can safely speak of an impoverishment of the mental life in the case of animals whose limbs become adapted for running.

That subsequent improvements in this respect are not impossible we see in the case of the dog, as its bark is a sort of language that it has acquired by its companionship with men. The rough, jerky sounds rather remind



FIG. 15. —THE AUSTRALIAN DINGOO.

us of those emitted by the Australians (in corroborees) and the chimpanzee, and it is quite possible that in the dog's bark we have an imitation of the raucous voices of our primitive ancestors; for the link between man and the dog is very old, though we do not find the dog in association with man in Europe during the Old Stone Age. It is interesting that the Australian wild dog, the dingoo, which has not been tamed by the aboriginals, in spite

of all the kindness shown it, never barks. It howls like the wolf.

The line of evolution of the various human languages has hardly been a subject of systematic research up to the present. That is because the philologists of the older school had, as a rule, no scientific education or method. It is only now that we are connecting morphology and linguistics. For practical reasons it would be advisable to proceed more rapidly with this work, as it is to be feared that the few surviving primitive races, which alone can give us correct clues to the early speech of man, will soon be extinct. It is urgently desirable to study thoroughly the various dialects of the Australian tribes before it is too late. It is true that of recent years there has been more interest in their language, but it is rather from the side of ethnology than of primitive history.

We may also expect to learn a good deal from the study of the sounds made by the Primates. Garner's attempts to study the language of the apes made a beginning of this. Even the sounds made by the European child in the first few months after birth promise clues to the evolution of the primitive vocabulary. For instance, the relation of the sound "ma" to the movement of opening the mouth in sucking the breast is significant.

The sources of the primitive vocabulary must have been numerous and varied. We have already noticed the sensations of pleasure and displeasure and herd-noises. Then there are the names of surrounding objects which are often formed by imitating the sound they make : a process we call "onamatopocia."

The faculty of imitation, which is proverbial in monkeys, has had a good deal to do with man's development. Imitation of the ways of animals forms part of man's amusements (dog-dances, kangaroo-dances, etc.), and imitation of the noises they make is connected with this. As man, being the nearest to the primitive form, has the most comprehensive structure, it is not difficult for him

to reproduce the various noises in which the different types of animals have specialised. Modern variety artists sometimes give wonderfully clever imitations of animals, even of birds, though these have a special type of larynx for their song—a “syrinx,” which has developed at the point where the trachea narrows.

In the case of the child we find an imitation of the sounds made by animals used as names of the animals



FIG. 16. —THE AUSTRALIAN DOG-DANCE

(“bow-wow,” etc.), and we are tempted to see in this a reminiscence of an ancestral practice. Examples of it are found in every tongue (“cuckoo, crow, peewit,” etc.). In one of the dialects of eastern Australia I found that the name of a common eagle in those parts was “bidju,” which is a perfect imitation of its note.

But the principle applies to more than animals. A number of natural processes have been named in the

same way. The noise of water has given us "stream" and "flow" and "ripple." The Latin *acqua*, the English "water" (British and Irish "usk," German "wasser," etc.), which remind us of the constantly repeated "arra," "warra," and "larra" of the Australian dialects, mean something gently flowing, and they are to be interpreted in the same way as the many derivatives of the Greek *reo* (to flow-- Rhine, Rhone, Rio, Ruhr, river, etc.). "Rain" is another example of the imitation of the sound. The Australian dialects have a good many examples. In eastern Australia I found the expressive word "merriba-merriba" for "thunder and lightning."

Here we can only give a few hints in regard to the early beginnings of human speech. The infinite complications of our declensions, conjugations, etc., are later developments, and should not be unintelligible when we have the basic principle. It is important to notice that the evolution of spoken language has nothing to do with the evolution of writing, which must be regarded as a late accomplishment. The Australian aborigines have no trace of written language, yet their spoken language is very complex. We can quite understand how the missionaries who studied the language in the early days of colonisation were led by the many resemblances to words of the "Indo-Germanic" group to believe that the aborigines had once lived at a more advanced level of culture; though of this there is no question. According to the missionaries it was the confusion of tongues at the tower of Babel that cut off the ancestors of the Australians from other races. Childish as these ideas are, they are of value in some respects, as they give us an impartial testimony to the Indo-Germanic affinities of the Australians; and this is scientifically confirmed to some extent by the structure of the face and skull.

The Australian dialects seem in many respects to be fragments of the primitive speech of man. The words

which are the same over considerable regions or found with the same meaning in widely distant localities have the best right to be considered primitive, and it is precisely amongst these that we find the most striking resemblances to Indo-Germanic words. The word "manda" (= hand), for instance, is found over a large area, and recalls the Latin *manus* (and the English and German "hand"). In the word "mera" (compare "womera," the original of "boomerang") or "mara" we see some affinity to the Greek *meros* (= member). Not less striking is the resemblance of "bina" (ear, leaf, feather, etc.) to the corresponding Latin word *pinna*. In Queensland I found the word "jepar" for "liver," which is in Greek "hepar"; and Basedow, an authority on the Australians, gives "kapata" for "head" (Latin *caput*) as used by a central Australian tribe. There is a flourishing little town in New South Wales called Toowoomba (or Tuwumba) after a "cucumber" (Latin *cucumba*) that grows in the district.

A particularly interesting chapter is the early history of the words and signs for the numbers. Here we find the human hand once more in a new part—as a calculating apparatus: as it is still used by young, and often by older, people. The Australian languages bring out the connection with the hand as clearly as the Roman numerals do. The Roman V is clearly the outline of a hand with the thumb extended, and the X represents two crossed hands.

The original numbers are one and two. These are found in all the Australian dialects, in some cases in two different expressions according as the second person spoken of is present or absent. The words for one and two ("unnar" and "djakala") have a certain amount of resemblance to the Latin (*una* and *duo*). Three is "one and two," and four "two and two." The Australian cannot count beyond four. Everything above four is the whole hand—"mande goma," as I found in a Queens-

land dialect—and may mean many, very many, or a great number.

When the Australian is taken in childhood and given a European education, he easily learns to count higher numbers and to master the elements of arithmetic. This shows that it is not a case of mental incapacity, but that the cause of the lingering in a state of primitive freedom is the isolation on the Australian continent.

Learning how to speak in childhood is for all human beings a summary repetition of the slow process of ancestral evolution. The child would not learn to speak so quickly if the brain of its ancestors had not been educated during a prolonged period in the art of speaking, quite apart from distinct languages. Otherwise we could not understand why a particular language is learned by a child only from copy. Children have an extraordinary talent for learning languages. I met in Australia the six-year-old child of a German missionary who had easily mastered German, English, and the native tongue. The faculty diminishes with age, and is not the same in all people. The Australian aboriginal learns a sort of childish English more easily than an Englishman learns German. Russians are very clever at learning languages. Other nations have not the gift.

The great plasticity of the human mind should warn us to be careful as regards the supposed racial affinities, which were once inferred from affinities of language. Germans, for instance, talk of a German race “as far as the German tongue extends,” but, in point of fact, there are considerable differences of race within the linguistic unity.

That individuals differ greatly from each other in regard to this facility need not be said, but it is important to bear this in mind in studying the progress of the race, as it is always the few who initiate advances, while the majority are unprogressive. For the development of the human intelligence is inseparably bound

up with the development of the speech-centre in the brain.

(In the second chapter we followed, in general outline, the development of the cerebrum in the Primates up to the point when the shifting forward of the eyes enabled the apes and man to develop a larger brain. The rounding of the skull by the enlargement of the anterior and middle sections of the brain in man is due to various causes. We have already said that the young of the apes closely

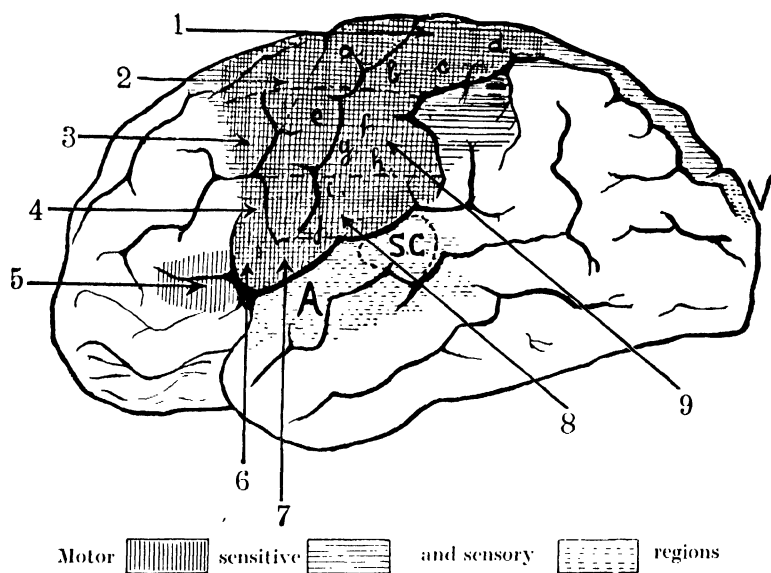


FIG. 47.—THE CORTEX OF THE HUMAN BRAIN (LEFT HEMISPHERE) AND ITS FUNCTIONS.

resemble the human young, and that there is then a degeneration of the brain accompanying a considerable development of the canine teeth. This cuts off the ape from the path to the human level, and it remains in a state of infancy. Further, the balancing of the head on the shoulders enables man in his erect posture to carry a heavier weight in it. The human brain retains the plastic qualities of the child in their full range. The brain does not grow larger after the tenth year. In

a sense, we might say that the brain of man is too big for what it does. Yet the large volume of it does not of itself prove his superiority to the other animals. Relatively to the size of the body, the human brain is not larger than that of some of the American monkeys.

Experience shows that many parts of the brain may be removed by injury without causing any alteration in the general mental life. It is, therefore, clear that some parts are a sort of luxury, and can be dispensed with. There are, however, other, and often small and sharply limited, parts of the brain which cannot be injured without grave disturbance of our powers of sensation or movement. We have already described the centre for the sense of sight. There is another for hearing, in the lower and lateral part of the cerebrum, on the edge of the temporal lobe.

The centres for the accomplishment of the chief motor processes lie all together on the fissure called the "suleus centralis Rolandi," which is one of the most important common possessions of the Primates. The "pre-central" convolution contains all the centres for the muscles of the body in a particular order—as if there were an inverted picture of the organism in that part of the brain (Fig. 47). Nearest to the skull are the centres for the movements of the lower limbs; at the side of and below these are the centres for the trunk; then for the arms and hands; and further down for the head and the various parts that have been evolved from the gill-arches of our remote ancestors. Included in the latter are the mechanisms needed for speech, the larynx and tongue. This ancient gill-centre has been converted into a speech-centre, controlled by the will and mind, by being linked up with other centres, especially those of hearing and sight—by means of "association-paths," as the modern anatomy of the brain puts it.

In this respect there is a remarkable inequality between the two hemispheres of the brain. Numerous observa-

tions of the effect of injuries to the brain have shown that the chief centre for speech is on the *left* side, in the lower part of the temporal lobe, which at this point grows over a part called the "insula." Exceptions to this rule are our "left-handed" individuals, who from birth onward use the left hand as naturally as most people use the right. This throws some light on right-handedness. We know that the nerves which go from the cortex of the brain to the surface of the body *cross*: that is to say, the centres of the left hemisphere serve the right half of the body, and vice versa. As the left hemisphere is, as a rule, the more favoured in development, we see why it does more than the right, even in things which are outwardly visible. It is not only a question of the speech-centre. There is the same "asymmetry" (disproportion) in the vision-centre on the posterior lobe. Injuries—bullets, for instance—to the back of the head cause far worse disturbances on the left side than on the right.

A good deal has been written about right-handedness. We do not know the ultimate cause of it, but we are in a position to say whether or no it is an acquired character in the case of man. Examination of the brains of the apes shows that they have the same asymmetry. It is, therefore, not a recent acquisition, but a profound difference between the two halves of the body; and it is found also in other systems of organs, such as the alimentary and the vascular (blood vessel) systems. As the same inequality is found in the lowest groups of the vertebrates, it is probable that there never was a complete equality of the two sides of the body.

This inequality can generally be recognised in the skull of the living man by the prominent part of the back of the head. The whole skull, however, is marked by asymmetry; indeed, it is quite generally found in the face, and to such an extent that a human face with the two halves perfectly equal would seem to us unnatural.

One has only to think of the wax figures in a shop-window to see this. The stiff, lifeless impression is due to the artificial uniformity of the features. This common occurrence of inequality of the two halves of the face



FIG. 48.—THE VENUS OF MILO, BEHIND A WIRE-GRATING TO SHOW THE ASYMMETRY OF THE FACE. (HAASE.)

was discovered by the Breslau anatomist, C. Haase. He pointed out the obliquity of the face—possibly reproduced with instinctive accuracy by the sculptor—in the classical statues, such as the Venus of Milo. The subject has not

yet been studied in detail, but a few points may be mentioned which seem to show the rule.

The position of the eyes is particularly important in the expression of the face, and it is astonishingly different on the two sides. The right eye, as a rule, lies lower than the left relatively to a plane across the ridge of the nose, and the upper edge of the left eye-orbit and the left eye-brow are generally much higher than the right. It has recently been recognised that as a rule the right eye is the better of the two. It is the one we chiefly use in looking at things. The practice of wearing a monocle, which is so often ridiculed, is connected with this asymmetry of the eyes. The existing inequality, which has much to do with the hypnotising quality of a look, is increased.

As the speech-centre belongs to the front or "frontal" part of the brain, this part of the brain is much altered by the increased activity. New paths arise in the cerebrum; more centres are formed in the cortex. We may regard a large part of the cortex as the province in which the advancing intelligence creates new central workshops for itself. Reading and writing are new functions for which there were originally no centres. They were developed—in the latest stages of man's evolution—by combinations of the centres of seeing, hearing, and speaking. The reading-centre is now believed to be a region in the lateral part over the left temporal lobe.

The more combinations are developed between the various parts, the more promptly the brain works as a whole. The frontal part is obviously the chief seat of these combinations. Precisely those parts which we called a "luxury" are entering the service of neighbouring parts and becoming of great importance in the advance of the human mind. The changes in man's head, especially the front parts, are connected with this. The fine dome of the forehead, which the Greek sculptors exaggerated in representing the majesty of Zeus, is a purely human acquisition, and in virtue of it the higher races rise above the lower.

CHAPTER VI

SEX AND MOTHERHOOD

IN view of the extraordinary increase in mental power since the dawn of humanity, it will be asked whether we ought to regard primitive man as clever or stupid. The question is justified, but it is wrongly expressed, as the ideas "stupid" and "clever" are now so bound up with the impressions of civilised nations, that we cannot apply them to the condition of primitive man. It is much as if a man on the top of a mountain were to try to appreciate the differences in height between the valleys and the foot-hills. Everything seems to him to be on the same level, whereas there are really considerable differences in altitude: everything seems very low, because the observer is very high. We cannot possibly put ourselves back on the lower rungs of the ladder up which civilised humanity has climbed. But precisely for that reason we must be on our guard against disdain of our primitive ancestors. "Uneducated" as they were, they must, nevertheless, have had the capacity for evolution, to which we owe the rise to our present level.

It is not a question of amount of knowledge, but of this youthful freshness and power to rise. Uneducated is not the same thing as stupid, for the latter excludes the capacity of further development. The faculty of swift comprehension, which primitive races of to-day have in common with the children of civilised nations, is a proof that early man cannot have been stupid.

We see the force of this when we study the Australian

aboriginals. When they discovered the continent, they were at a stage corresponding to that of man of the Great Ice Age in Europe; a time which was certainly more than 100,000 years ago. As they had no communication with the other members of the human family, who rose in their various ways to higher stages of culture, the Australians lingered in the primitive condition. But they did not lose the capacity of development. Aboriginal children who came into the hands of Europeans have been educated up to the same pitch as white children. In quickness of comprehension the Australian children are really remarkable. Even the adults are superior to the whites in some respects, particularly as regards the observation of nature. They cannot, therefore, be described as "stupid." The hard struggle for existence leaves the savage no chance of being "stupid"; as so many individuals in civilised countries can be without any danger to their lives.

All beginnings are difficult, and that was certainly the case with the earliest advances in culture. The little herds which primitive man formed imposed quite different duties upon their members than those which a civilised community does. This brings us to the commencement of social life and the question whether we should call the early men "good" or "bad." These ideas are inapplicable to the early condition. They are relative, and we have no right, from the scientific point of view, to apply the ethical, philosophical and religious standards which the words imply in the language of ancient and modern civilisations. In speaking of the primitive condition, the words must be used in a social sense. A thing is good when it promotes the good of the herd: bad when it injures the herd.

We have already said many times that man was a social being from the start; as Aristotle recognised when he defined man as a "political animal." Man maintains the primitive condition, which the man-like apes, especially

the solitary gorillas and oranges, have forfeited. We thus get a clear starting point for the study of all the social conditions of humanity. Man is a gregarious animal: the tribe was developed from the herd.

The practices of the Australian aborigines give us many clues to the earliest organisation of the human community, as they have no sort of institution that could be put on a level with anything that we find among civilised peoples. There is no "authority," but, as in the animal herd, the older males rule the others: not of right, but in virtue of their physical superiority.

In the animal herd the adult males are always fighters, and it must have been so in the primitive human herd. And the object of the fight remained the same from the animal level onward. Woman was the object, reproduction the reward.

In regard to the great sexual differences that we find both amongst humans and apes, it is important to realise Darwin's principle of sexual selection, which applies here in its full force. We must bridge the gulf that seems to separate the human tribe from the animal herd by a logical sequel of all that we have as yet given; the possession of the hand enabled man to pass from natural fighting implements to those which we call "artificial," because they have been shaped by the hand of man. We may suppose that this change was slow and gradual. The abandonment of the hand as a prehensile apparatus compelled the apes to fall back upon natural weapons—the canine teeth. The conflicts of the male gorillas for the females, which became relatively scarce in consequence of their isolation, must have been terrible. The elimination of the weaker males and the increasing terror of the fight from generation to generation are enough to explain the enormous development of physical strength; and, by the principles of heredity, this was transferred to the other sex, and the females also shared the new strength.

(It must have been quite different in the evolution of man. The erect attitude of the trunk caused the men to fight eye to eye, and breast to breast; and in this the gymnastic training which man's peculiar method of climbing gave him proved once more of great service. The first "artificial" weapons were sticks, such as the apes occasionally use, and stones; but, naturally, all weapons that were used in the hunt would come to be used in the sexual combats. It is beyond question that male beauty and strength are as much an outcome of these combats as the stag's horns. That is why man is generally bigger and stronger in body than woman.

These sexual struggles between members of the tribe are older than collective fights (like modern wars) over the possession of land. There was plenty of room for all in the early days of the race. The situation was much the same as in Australia before white men reached that country. Small groups of from twenty to fifty men wandered over particular districts. In a sense, one might call them nomads. But if the word is taken to mean that they had no sort of "home," and wandered over the whole continent, it is quite wrong. Every tribe has its own district and knows its boundaries very well. It wanders only within the limits of this district, so as not to exhaust the game at any one spot. There is plenty of room, and such things as fights between neighbouring tribes for a region have never been reported in Australia. It is true that the tribes do fight, but it is not over land; it is to steal each other's women and to avenge injuries.)

These things teach us the great antiquity of the duel, and enable us to understand how an institution which is sharply opposed in its own nature to the higher development of the juristic education of civilised nations has held its ground with such extraordinary stubbornness. And woman is still the chief object of the duel.

The ancient connection between the combats of males

and the sex-life has led to the women of all nations and ages giving the preference to soldiers over other men, even where fighting qualities are no longer needed to get a mate. This is the key to many of the details of mythology, such as the relations of Mars and Venus. Many apparent trivialities become intelligible when we see in



FIG. 49.—AUSTRALIANS WITH SCAR-TATTOOING.

them relics of the remote past lingering in civilisation. The scars on the faces of German students have a parallel in the scars on the bodies of the Australians, by which they show their love of, and skill in, fighting. The custom is so deeply rooted in Australia that it has been adopted even by the women, who make little cuts on their breasts and arms, though in their case these things

have no meaning. The men artificially increase the size of the scars by rubbing soil, etc., into them.

(The scars on the breast and belly, and often on the arms and thighs, of the Australians, form part of the education of their youths, as the object is to accustom them to bear pain. For the same reason they knock out some of their best teeth—the middle incisors of the upper jaw, sometimes on one side, sometimes on both. It is done amongst other peoples, but we cannot see any special meaning in it.

The only thing one can suggest is that the cruel experience is to be an unforgettable reminder that they have reached the dignity of manhood. They are tortured and mishandled in other ways also during these initiation ceremonies. From the wide distribution of these performances—they are found also in Africa and America—we can measure their great importance. (Admitting a youth to bear arms was an occasion of much importance to the tribe. Youths who could not manfully bear the tortures and rough treatment were weeded out. Amongst the Australians they sometimes die under the ordeal. It is the principle of social selection that explains this apparently crude method of initiating youths. The tribe needs strong men for the hunt and the fight if it is to preserve its life. The ceremony of "Confirmation" is a continuance of these ancient ceremonies. The religious element was added later; the original feature is the recognition of the attainment of manhood.) The festivals of German students, in which many old features survive, recall the primitive ceremonies when they are initiating a new student.

There is also a good deal of physiological interest in the duels, in which the Australians strictly observe a certain code of honour, all trickery being excluded. It is important to bear in mind that this fine feeling of what we call the noble and chivalrous is thoroughly primitive. That "savage gentlemen," the Australian

aboriginal, shows us, by his natural pride, that primitive man was quite a superior person, a king in his own domain. In spite of his "savagery" there is nothing low or bestial about him. Wherever we find these things—and we find them in many of the lower races—we are not really dealing with primitive man, but with a deterioration from the original level, a secondary acquire-



FIG. 50.—AN AUSTRALIAN GIRL WITH
PRIMITIVE JAWS.

ment of characters such as we have amongst many of the anthropoid apes and the monkeys.

Hence, what we call the lower races of to-day, must not all be put on the same level from the ethico-psychological point of view. For the reputation of that branch of the primitive race which has given birth to at least a very large part of the present population of northern

and central Europe, we must make it clear that it was related to the Australians, and that, therefore, the excellent qualities we find in the social life of the Australians to-day may be transferred to it.

The affectionate mutual aid of the members of an Australian tribe is quite a pleasant sight. There are none of those wild outbursts which show us human characters in many ape-caricatures. Although their relationship to each other is quite different from our family relationship, their common life is very much in the nature of family life. The respect of the younger for the older members is a fundamental characteristic, and it has been honourably mentioned by every man who has studied them. Their readiness to share their food with each other and to help the weak and infirm need not shrink from the test of the Sermon on the Mount. The affectionate treatment of the children may at times seem exaggerated. It reminds us of the conduct of some of the more emotional races of southern Europe.

In other respects it may remind us of "ape-love"; but that is, after all, only the expression of a strong craving for affection, which we find in their conduct to other animals also. It is well known that female apes often extend their maternal feeling to other small animals. The Australians keep a number of animal "pets." These are generally dogs—originally the Australian wild dog, or dingo, which must have reached the Australian continent together with man. Being the only higher (or "placental") mammal besides man in Australia, it must have been a sort of companion, whether or no there was any mutual advantage to connect them. Such an advantage might be suggested, on the analogy of higher races, in hunting; but, strange to say, the dingo has never been domesticated by the aborigines. It has remained wild. That, however, does not mean that it never followed man and shared the profit of his hunting; but the aboriginal never received any return



FIG. 51.—AUSTRALIAN TRIBE IN THE BUSH (WOMAN WITH A DINGO IN CENTRE.)

for his kindness, particularly to dingo pups. They are taken from the "nests" in hollow trees, and often suckled by the native women.¹

Animals nourished in this way are nearly always eaten after a time, but as soon as the young dingo grows up, he feels the impulse to be free, and off he goes. It is, therefore, not surprising that the aborigines are more devoted to the tame dogs of the Europeans. There are large numbers of them in nearly every camp, no matter how far it is from a white settlement. The old women are often surrounded by a dozen or more of these pets. In the missionary settlements there is a veritable plague of dogs, as the aborigines share the food given to them with the dogs, and would rather go hungry themselves than see their pets run short. Occasionally a policeman has to go out with a rifle to thin the canine population. I saw, on one such occasion, all the women of the camp fly to the bush with their pets. In another place I saw a dog with only two legs. The police had shot away the other two, but the women had saved its life. When the dogs die, they are buried just like human beings.

All sorts of animals besides pups are kept in the camp as play-fellows for the children—young opossums, kangaroos, etc. In recent times monkeys have been introduced into Australia, and it is most amusing to watch the behaviour of the natives to these distant relations. They recognise them as equals, and treat them only too well. It is also interesting to note that an ape which I took from Java to Australia was very hostile to Europeans, but quite at home immediately with the natives.

¹ The suckling of young animals by women of the lower races is common. They just seem to regard them as "fellow-animals." Jung tells us of Australian fathers who killed their new-born children and gave the mothers a couple of pups to suckle. Polynesian and even Maori mothers also feed pups and young pigs at the breast. Indian mothers in South America suckle young monkeys, goats, etc. Siamese mothers also suckle young monkeys, and Aino mothers young bears. [Heilborn.]

The contrast of this tender treatment to the rough handling of the male youths in the initiation ceremonies is only apparent, because the latter really brings out what is best in the youth and is part of a system of training the young, which primitive man inherited from his animal ancestors. Amongst all the mammals we find a sort of education of the young, and it is most pronounced in the case of those animals which take most care of the young. We might even extend this to the birds. Flight has to be learned just as the human young must learn to stand upright. The cat teaches its kittens to catch mice. Amongst all wild animals the instinct of imitation in the young is directed by the parents or the group. Much of this has become instinctive in birds. The pressure of life gives no time for rest before they enter upon the struggle. In the case of man the dependent period is far greater than in the case of any of his animal relatives. Here again he is primitive; he remains embryonic for some time after birth.

The entrance into life is amongst savages far simpler and easier than amongst Europeans generally. Although the savage woman has a rather narrow pelvis, the head of the child emerges with little difficulty. This is mainly on account of the great elasticity of the bodies of mother and child amongst lower, and still largely animal, races. The head, also, is not quite so large in their case. The narrow pelvis of the Australian woman recalls the type of the ape. Crude drawings and carvings of human figures which have come down from the Ice Age period in Europe, show a female body very like that of the Australian woman in the shape of the loins. The great development of the abdominal region, which forms part of the æsthetic ideal of a woman's body to-day, is due to an adaptation to the increased size of the child's head amongst civilised peoples. But sexual taste has also played a part, favouring the broad-hipped mother.

We have only to think of the differences of taste in this respect. North Europe prefers slender figures ; the south

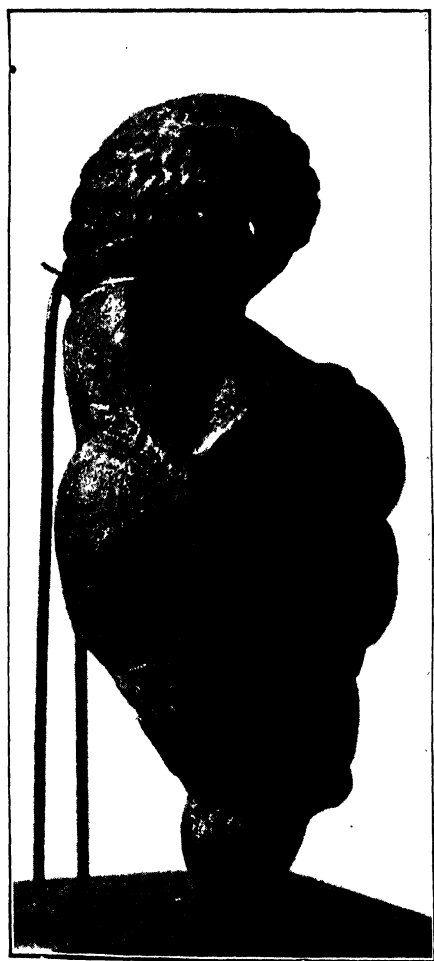


FIG. 52.—THE "WILLENSDORF VENUS,"
A PREHISTORIC STATUETTE OF THE AURIG-
NAC PERIOD.

Italians prefer the *bella grossa*—the full-bodied beauty. The large amount of fat in the abdominal region has certainly been cultivated in many places by selection.

Hottentot women have enormously fat buttocks from this source.

In the same way the woman's breast has been developed to a very high aesthetic stage. Amongst the animals the enlargement of the breast is a periodic function, following only upon child-birth. They never have permanently large breasts as human females do. At the most one might venture to compare the cow's udder, as in both cases the fat below the skin has developed into a cushion with its highest point round the teats. The characteristic thing in the human female is the persistence of a large breast, independently of child-birth. In explaining this development, which has no parallel amongst the apes—at least, there is no reliable account of any—we have to take various things into consideration. One point is the change in the time of procreation. There is no doubt that in the earlier animal stage of our ancestors the sex-impulse was periodic: that there was a season of heat, as there is amongst wild mammals to-day. Man has freed himself from this law. He is at all times desirous and capable of reproduction; though in the menstrual function it is possible that we have a trace of a time when the sex-impulse was confined to certain seasons. The evolutionary explanation of menstruation sends us back to the remote past when our mammal ancestors were small creatures with a much shorter period—possibly a four-week period—of gestation.

A still remoter period is suggested when the four-week period is brought into connection with the changes of the moon and its influence on the sea. There is such a connection in the case of invertebrate animals, and Darwin thought it possible that there may have been some influence on the higher animals.¹

¹ More recently an author has suggested that menstruation may be a relic of an early hunting age, when the time about full moon was used for hunting, and so there was once a month a specially large supply of food.

The cessation of the woman's power of reproduction between forty and fifty is probably an indication that in former ages the life-energy was exhausted much earlier than it is in modern man. There is no reason whatever to suppose that our ancestors had longer lives than we have. The period of gestation has grown longer, and there has also been an extension of the period of dependence upon the mother. Amongst the Australians and other lower races, children are suckled for from two to four years, and cases are not unknown in Europe—in Italy, for instance. This longer use of the breast favoured survival. That the force of heredity then made the large breast a permanent possession, an adornment, making its appearance even before the sex-life set in, is not improbable in view of the close nervous connection of the breasts with the sex-organs proper.

The fatty tissues underneath the skin provided the aesthetic material for the development of woman's beauty of form; and, as the naked early period lasted far longer than the few thousand years during which clothing has been worn, the force of heredity still maintains the effects of sexual selection—which, naturally, would only have full power when the attractiveness was visible. There is a real danger of the deterioration of female beauty on account of the wearing of clothes; and, as far as the breasts are concerned—and they lose their function more and more in Europe—the aesthetic loss may be accompanied by dangerous consequences to the life of the race. It would be well for the over-zealous apostles of "decency" to take these facts to heart.

The close relation of the breasts to the other sex organs is seen not only in nervous connections, but in the position of the teats. In our pre-human ancestors these ran in two lines from the arm-pits to below the waist (Fig. 6). There were six or more on each side, showing that at that time there were more young at each birth. The human female has retained only the

pair on the "breast"; but we often have relics and traces of the other pairs. They are not merely found during embryonic development, but there are sometimes supernumerary teats on the lower part of the trunk. Possibly the representation of the Diana of Ephesus (Fig. 53) in Greek mythology, with a large number of breasts, is due to knowledge of cases of this kind. There is still almost constantly at least one such additional "breast," above the real breast, even in the case of European women. It has no teat, and very rarely gives milk. It can almost always be seen on the breast of a well-formed woman; and classical statues like the Venus of Milo show it. These superfluous breasts are also important from the pathological point of view, as cancer generally spreads from them to the arm-pit.

There are many well-known instances of supernumerary breasts in history. The mother of the Roman Emperor Alexander Severus was named Mammaca because she had them; and Anne Boleyn is another instance. The highest number of breasts yet reported in a woman—a Pole of Warsaw—is ten, and they all gave milk. They are not infrequent even in the case of men. In observations of recruits made by Bardeleben and Ammon it was found that there were no less than 14,000 cases out of 100,000 men. They are much more frequently on the left than on the right side. Anthropological literature tells of many cases in which men had their breasts fully developed. In some cases they suckle babies just as women do. Miani and Schweinfurth report it as common in central Africa. In women the breast is often more developed on one side (generally the left) than the other; and there are cases in which they develop so little as to give no milk (especially on the right side). F. Seiners says that the women of Kingbush (to the north of South West Africa) often have their breasts near the arm-pit; which looks as if in their case it is a pair of the generally atrophied breasts that develop.

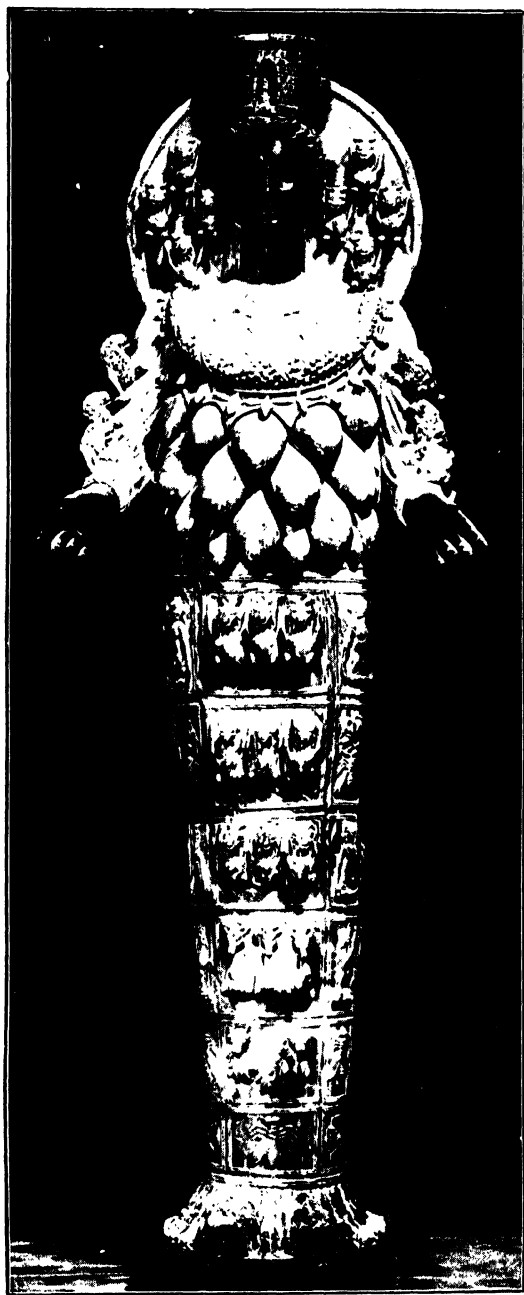


FIG. 53.—THE DIANA OF EPHESUS

The beauty of woman is the outcome of human sexual selection. The comparatively recent date of this development can be gathered from the complete absence of it amongst the anthropoid apes and the great diversity which different racial tastes have brought about.

Sex-life began at a much earlier age in the primitive days of the race. The early sexual maturity which we find amongst southern peoples is really the original state of things. The postponement of it amongst northern peoples is probably connected with the more exacting conditions of life in a colder climate. But this has not been without its compensations. We need only mention here that it has led to the preservation of womanly beauty for a much longer term of life.

What the life of the child was in primitive times we may learn from the Australians and other lower races. The affectionate treatment, which we have already mentioned, takes care that the child has plenty of means of play at all times, and in its play the instinct of imitation is encouraged in such a way that the child makes some preparation for the work of later life. The Australian boys have their weapons just as ours do, and living animals are fondled as dolls by the girls.

In the lower races we may see a special element in the play of children—a reminiscence of ancestral conditions and impulses. Just as the embryo has to go through the gill-arch stage if the body is to have a larynx, so the child in its mental life has to go through the impulses and actions of our ancestors. Hence the love of animals, the martial enthusiasm, and so on. It is very amusing to see how they act the primitive warrior with their wooden swords and shields, and how they put together crude sheds or houses with boards.

But the material of the child's imaginative life is drawn from still earlier ages. There is many a pre-human element in it, especially in the first years, when the external world has still little hold on the child's mind.

The brain can never be entirely idle, and probably at that stage pre-human traces stir the nerve-cells of the cortex to action. Possibly it is the same even during the embryonic life in the womb. What sort of activity this is—what feeling accompanies the physical processes provoked by internal stimuli—we may, perhaps, more or less gather from our experience in dreams.

Before birth the embryo is asleep. Its mental life is purely internal. Whence can it derive its material? The only source one can imagine is that ancestral impressions rule the embryonic brain. Memory—what Richard Semon calls “Mneme”—as an hereditary force, the force which builds up each muscle and organ long before it can show any usefulness for a particular purpose, also provides the brain with embryonic thoughts and feelings. After birth these are replaced by the new material that streams into the central sea of consciousness through the channels of the sense-organs. It is only at times, afterwards, that in our dreams we get glimpses of strange things which we have never experienced. They are ancestral experiences.

These are logical sequels of the doctrine of evolution. The man who thinks that they are “too speculative” may be reminded of the terrible tenacity with which hereditary diseases, particularly of the nervous system itself, persist through several generations. Even in a quite normal and unmistakable way the child “climbs the ancestral ladder” before it reaches sexual maturity. The thigh-bone of the modern European is up to the tenth year curved as the thigh-bone of his Tertiary ancestors was. Just as in the body the older hereditary elements have to be replaced by new and later, so there must be a succession of stages in the brain itself.

From this an important practical conclusion follows. It is always dangerous to interfere violently with normal processes of development. It may, therefore, be very detrimental to the whole mental life to check the child's

instinctive love of fairy tales and similar literature, and give it premature intellectual instruction. It is bad enough to have drill in schools, as it sadly checks the fresh originality of the child's mind, which reaches a special stage between the fourth and sixth year, and brings it down to a standard level. How much richer the mental life of children would be, and how many more men of originality we should have, if our schools were revised and reformed from the evolutionary point of view. The human being has to learn; but he would learn much more in play, to which his instincts direct him. How much is lost by forcing upon the poor brain so many things that are of no use to it! Perhaps the tragic record of child-suicides will show the need of taking scientific counsel.

Even the savage child learns. In fact, children in the Ice Age must certainly have occupied themselves with things that helped to prepare them for later life. The Australian child learns first to distinguish the foot-steps of those related to it, especially of its mother. It is then introduced to the great store of knowledge gained by observing plants and animals, which is of great importance in the struggle for life. Next it gets the rougher training in life's duties of which we have already spoken. The arrival of puberty is gathered merely from the visible changes of the sex-organs. Primitive man had no scale of time on which to calculate these things. He does not even now count the hours.

CHAPTER VII

THE EVOLUTION OF CLOTHING

OUR division of the year into months, or moon-periods, clearly shows traces of the earliest beginning of chronology. In our climate we can scarcely understand the importance of full-moon as a time for holding festivals. Even the fixing of the Easter festival by the moon is not much of a success. But when we remember that in prehistoric times all assemblies for festive purposes were held during the night, as they are amongst savage races to-day, we begin to realise the great practical significance of the light of the moon.

Any man who has seen the magical splendour of a moon-lit night in the tropics will fully appreciate the importance of such nights in the social life of primitive humanity. Primitive elements reappear in poetry, and we can, therefore, quite understand on evolutionary lines the enthusiasm of poets for moon-light, as well as for the spring. For men who live in the tropics the change of seasons has not a great significance, but the situation must have been entirely different in the case of our prehistoric ancestors in Europe, who struggled for life through all the rigours of the Great Ice Age: the average annual temperature was then many degrees less than it now is. The change of seasons was much the same as it now is, but the winters were longer and colder, and the summers shorter.

Those branches of the race which settled in countries of raw and trying climate needed clothing and houses

very differently from the men who remained in the paradise of the tropics. Curiously enough, many of the lower races, such as the Fuegians, have remained without clothes and houses in spite of the severity of the climate. The southern parts of Australia and Tasmania, again, have a much cooler climate than the tropical north, yet there is no difference in the aborigines as regards protection from the weather.

The first Europeans to come into touch with the Tasmanian aborigines, at the close of the eighteenth century, expressly tell us that they did not wear clothing. The women, it is true, wore kangaroo skins; but these were not so much clothing as a means of carrying the children about as in a sack. Tasmania lies between 41° and 43° S. lat., but the climate is colder than the corresponding latitude in Europe, because south of the island the ocean stretches unbroken as far as the icy waters of the Antarctic.

This shows that even the simplest form of clothing has to be learned from impulses which originally have nothing to do with protection from the cold: namely, the love of ornamentation and the concealment of parts of the body for sexual and other reasons. Study of living savages proves that ornamentation is older than clothing. The body of the naked savage of the tropics is treated in various ways to make it more attractive to the opposite sex.

We have spoken briefly of the loss of the hairy coat of our ancestors and suggested that the constant use of fire may have brought about this important difference between man and the ape. Whether this is true or no does not affect the reality of the sexual selection which, after the loss of the hairy coat, controlled the further modification of the body. What we have already said in this respect about the development of the beauty of the female body may now be expanded in various directions.

The special development of hair in the pubic regions is, as we said, a feature peculiar to man. In our hairy relatives of the Primate family these regions are not conspicuously clothed with hair, and so we must look



FIG. 54.—A PAPUAN WOMAN WITH GRASS SKIRT.

for some other factor to explain it. No other agency than natural selection can be discovered. Darwin has shown in his fine treatment of the subject that forms which are closely related to each other may come to

diverge considerably by the development of features which are designed to stimulate the sex-impulse. This is the case with man and the apes, as the latter have none of this special development of pubic hair. The chimpanzees, however, have certain developments of colour, and the baboons glaring colours 'of the skin of the buttocks, which must be understood as modifications for the purpose of attracting attention to those parts.

It is necessary to apply the same interpretation to the human pubic regions. When the young matured in the early days of the race, it was the appearance of the pubic hair that drew attention to the sex-parts and stimulated to the use of them. Studying the matter from this scientific point of view, we see clearly that the feeling of shame or modesty was not an original feature of the human race. Male savages are quite devoid of it to-day, though in the case of the females we see the same indications of reserve and retirement as in other female mammals at the season of heat. But it would be a mistake to interpret these things on the lines of a civilised ethical code. Part of the system of increasing the sexual excitement of the males is a sort of struggle of the sexes, of which Darwin gives instances taken from all classes of animals. It is on this principle that the female aboriginals of Australia cover their external sex-organs. Even in this concealment, however, we must, scientifically, see only a new method of incitement. Hence it is that the various ways of covering the sex-parts amongst savages cannot in the least be regarded as in the interest of chastity. The cord with tufts of opossum fur which is tied round the loins of the women in Australian tribes that have not yet been affected by civilisation, the short skirt of reed-grass worn by women of the Pacific Islands, and the fringed leather girdle of many African women, are not for the purpose of concealment, properly speaking, but are essentially decorations, a more complex and refined

development of which we may see in the underclothing of the ladies of civilised countries.

We cannot doubt, therefore, that the chief source of the evolution of clothing was, not the desire of protection of the body, but sexual—which means, in the long run, the love of ornamentation. At the primitive level amongst the males coverings are much less important than special treatment (sears, etc.) of the naked



FIG. 55.—SKULL OF AURIGNAC MAN, WITH CHAIN OF SHELLS AS FOUND. (HAUSER.)

body. The male Australians, it is true, wear a girdle, generally made of human hair. Primitive man makes a considerable use of hair for decorative purposes. The Australians carefully collect all the hair they cut off, and make even the shortest lengths into cords by rolling them on their thighs until they have long and thick strands. Besides hair girdles they have shell and other ornaments. When these are worn over the sex-parts,

they are generally regarded as for the purpose of concealment; but, as the same things are worn *behind* also, the interpretation will not hold. There is, moreover, no support of such a theory in the general ideas and sentiments of the aboriginals.

We have already said that scars are a very important



FIG. 56.—A SAMOAN GIRL WITH SHELL NECKLACE.
(HEILBORN.)

and primitive means of decorating the male body, and we have pointed out their sexual character. To a less extent this form of ornamentation has been adopted by the women. The Australian women have rows of scars, especially on the neck and breast: possibly they are meant to be imitations of chains.

A statuette of a woman found amongst the relics of the men of the Ice Age in southern France, known as the "Venus of Brassempouy," clearly shows scar-marks of this description: another indication how much the men of the Ice Age resembled the savage of to-day, even in ornamentation. Other features point to the same conclusion. The necklaces of snail and other shells which we have frequently found with the fossil skeletons of men of the Ice Age have their parallels in the ornaments of living savages. Another point of agreement is the painting of the body. Various colouring stuffs—white, brown, yellow, and red—which are found in nature are used for the purpose. In one Australian tribe I found that they were using a green colour, and, following up the matter, discovered that they got the colour by chewing the leaves of gum-trees (*Eucalyptus*). They used the green spittle for painting themselves!

Combination of the two kinds of ornamentation—scars and painting—led to tattooing,¹ in which the colouring matter is rubbed into the wounds. In spite of the use of clothes the custom is still prevalent in Europe, and is often resorted to for superstitious reasons.² The Pacific Islanders, especially the Polynesians, use the practice very extensively. It was found in an extreme form amongst the Maoris of New Zealand, who used to have most complicated patterns tattooed on their faces.

Painting the face without wounds is also a very widespread custom. Amongst some of the tribes of

¹ The word "tattoo" comes from Tahiti, and means "artistic."

² In *The Artist* (No. 1255) a few years ago a London tattooer, Alfred South, wrote that up to date he had tattooed 17,000 persons, including 2,500 ladies. He boasted that his clients included "the high nobility, the aristocracy, and officers of the British Army and Navy." In the *Globus* (Bd. 78, Nr. 16, 1900) a telegram from New York reported the same state of things in America. Albania, Bosnia, and Herzegovina are now the only parts of Europe where it is habitually practised on a large scale. The old women tattoo the young girls, from thirteen to sixteen, "for luck," after a religious service; and the designs are generally variations of the cross. Roman Catholics do not follow the custom. [Heilborn.]

northern Australia it is part of the daily toilet of the naked beauties, who assist each other to paint the cheeks with bright-coloured circles and points, changing the pattern every day. The women of the Aino, the original population of Japan, paint and tatoo themselves round the mouth in order to imitate the beards of the men.

The scars of students, the patches of a few generations ago, and the rouge and powder of the European ladies of to-day, are the last traces of this ancient form of ornamentation. Painting with red stuff often has a peculiar significance. Amongst many tribes red is the mourning colour; as Schiller mentions in his famous Indian "Lament over the Dead."

Here again there is a mystic connection between magic and ornamentation; and this connection helps us to understand many other artificial disfigurements of parts of the face which from our point of view can scarcely be called "ornamentation." We must remember, however, that all these words are relative. It is not the aesthetic element that is mainly consulted in these artificial alterations of man's appearance. It is a question really of a psychological element; the ornamentation, or lack of it, is supposed to have an effect which we can understand best by comparing it with hypnotism. Whether or no the effect is supposed to be produced on other men or on spirits, it is an attempt to exercise power or take certain precautions.

E. Selenka has, in his able work on *Human Ornamentation* (1900), attempted to analyse the problem psychologically. He has, quite rightly, drawn a parallel between ornamentation and language, and has pointed out the close connection with man's social instincts. He distinguishes between various methods of ornamentation—though this distinction ought not to be pressed—such as rings, pendants, imposed ornaments, and direction ornaments. The latter are mainly certain decorations of warriors (such as the feathers on the heads of Red

Indians), which are also meant to express a phase in the direction of the attack. Imposed ornaments are ornamental enlargements of various parts, or additions to them, for the purpose of impressing. Many pendent ornaments, also, are intended to make parts of the body—the shoulders, for instance—look larger and stronger than they are. Ring ornaments are to draw attention to certain parts, such as the arms or the sex-organs. Selenka regards the wearing of flowers as local colour-ornamentation. He rightly points out that many of these things are early stages in the development of clothing, and they then pass on to a higher stage after clothing has been adopted. He also notices the connection between head-decoration and ideas of magic, as displayed, for instance, in dancing masks.¹

The earliest head-dress seems to have been adopted for decorative purposes, not for protection against sun and rain. The hair itself was a sort of natural cap, and amongst the higher Primates it falls under the heading of natural ornamentation. It is like, the beard, an outcome of sexual selection. That there is nothing peculiar to man in the natural features of the hair-cap follows from the fact that young apes have it, and this is confirmed by an examination of the monkeys, many of which have a perfectly grotesque allowance of hair. It is, therefore, to be regarded as a special cultivation of a natural feature when we find savages with fantastic

¹ The origin of ornamentation may lie in the wish of the primitive hunter, when he had killed a beast, to keep its fur or teeth as a permanent proof of his deed. The best way to keep these would be to wear them, just as the Bushmen keep all their possessions about their persons. These signs of superior prowess would excite the jealousy of other men and the admiration of the women. When we reflect that much that the savage wears is not "ornamental," and that it is generally confined to the males, this view seems probable. Clothing may at first have been worn in the same way—a skin over the shoulders—and this would lead to a discovery of its warmth. This applies, of course, to any kind of ornamentation (birds, etc.), but for the full working out of the theory I must refer to my *Allgemeine Völkerkunde* (p. 92). [Heilborn.]

heads of hair, sometimes with the addition of artificial ornaments.

The hair of the head is still one of the finest natural elements of woman's beauty. Long hair is, however, not a peculiarly feminine characteristic. If it is carefully tended, as it is by the Indians, for instance, it will grow long on the male head.

The connection with the beard is unmistakable in the case of many of the monkeys, as they have the hairless parts of the face framed with hair. Darwin has very thoroughly described the sexual significance of beards in the apes. There is hardly any form of whiskers in man that has not a parallel in the monkey world; and, as we said previously, some forms—the beard, for instance—are found even amongst the lower mammals. The hairs of the beard are really special organs of a more or less perceptive nature—tactile hairs with a considerable supply of nerves. It is, therefore, not surprising that they have been enlisted in the service of the sex-life. As such, they were at first the common property of both sexes, and the special development in the case of the males is part of a general tendency in the mammal world.

It is interesting to speculate whether woman had a beard originally: whether, that is to say, the great difference between the two sexes already existed in our pre-human ancestors or arose at a later stage. Certainly we find that in races in which the males are comparatively hairy the women also are very apt to have beards. Quite apart from certain cases of women with conspicuous beards, which are quite abnormal and are merely freaks, there are a good many facts which point to a gradual degeneration of the beard in the case of woman. Many instances of women with beards have been found amongst the Australian aborigines. In a lesser degree the beard is not uncommon in Europe. When we examine with a lens the cheeks

and chin of a young girl's face, which seems quite smooth, we find clear traces of hair; and it never entirely disappears. When it grows a little, especially in the case of women of dark complexion, it can be seen some distance away. It is, curiously enough, particularly common amongst French women. It is not at all repulsive; in fact it rather adds to the attractiveness



FIG. 57.—JULIA PASTRANA, THE HAIRY LADY OF MEXICO.

of their fine features, suggesting that possibly we have here an instance of late sexual selection.

The hair on the temples is in an intermediate position between the hair on the head and that on the chin. Amongst the children of lower races and the monkeys it is often considerably developed. Artificial removal of the beard is not common amongst savages; though it is not unknown. Some savages—Malay races, for instance

—carefully remove every hair from the chin. The Indians often plucked out their eye-lashes and eye-brows. In general, savages that have a naturally good growth of hair on the chin cultivate it, while those with a poor natural growth prefer to be beardless. Many savages insert cards, sticks, etc., in the beard.

Of other artificial deformations of the features we



FIG. 58.—A CAMEROON WOMAN WITH
WOODEN DISKS IN LIPS AND EARS.
(HEILBORN.)

need only give a few illustrations here. We have already spoken of the knocking out of the front teeth by the Australians, which certainly cannot be regarded as ornamental. The same must be said, from our point of view, of certain practices, such as giving the teeth sharp points, which are widespread in Africa. Nor does the colouring of the teeth by chewing the betel nut, as the Malays and

Polynesians do, appeal to our aesthetic sense. Still worse is the deformation of the lips that is practised by many blacks and by some of the peoples of South America, such as the Botocudos. Quite large objects—wooden disks, quartz balls, bone plugs, etc.—are often inserted in the lips, and they dangle about at every movement. (Fig. 58). Some of them have to lift the upper lip with the fingers when they want to drink.

The nose, also, is grievously maltreated. It is a very widespread custom amongst the lower races to bore through the nostrils, and stick bits of wood or bone or rings through. I noticed scars on the tip of the nose in many of the aboriginals in the north-west of Australia.

Boring the ears is the only form of savage ornamentation that is familiar in Europe. Our ladies cling to this relic of early ages to some extent. The natives of New Guinea, for instance, stretch their ears enormously, so that objects as large as watches could be put in them. Some savages develop the ears until they hang down over the shoulders. The Masai woman (Central Africa), who carries brass spirals three to six inches in diameter in her ear-lobes, fits the burden into a leather belt over her shoulders, so that it will not tear the ears—which often happens. In the Marshall Islands the men often carry their pipes in their ears. “Rich” Herero women carry as much as ten pounds of iron ornaments on their legs, so that they can hardly get along. Weeks says of the Boloki (Congo): “I once took from a woman more than a dozen rings, weighing altogether about fifty-three pounds. She completely lost her balance when the weight was removed, and staggered as if she were drunk. One brass ring I saw weighed between twenty and thirty pounds.” King Chumbiri (Congo) had brass rings fifty to a hundred pounds in weight fastened round the necks of his wives. When the wives died, their heads were cut off so that the valuable rings should not be buried with them.

In regard to head-dress, it may be mentioned that the Australians and other natives in their dances wear head-gear to which they attach a sacred or magical significance. The meaning is not quite clear, but, as they certainly have some sort of hypnotic effect, it is possible that tokens of dignity were developed from some such objects. Another source of head-dress, in the case of the European hunter of the Ice Age, may have been the practice of donning the skin of an animal for the purpose of disguise in stalking the creatures. Bear-skins would be particularly apt to come under this head.

CHAPTER VIII

THE EVOLUTION OF THE HOME

HOUSING is one of the chief features that indicate the advance of man from savagery to early civilisation. We must, however, not think at once of houses in the modern sense, but of some centre at which the members of the primitive community foregathered, some common shelter from the storms of the early struggle for life. An extraordinary variety of developments is possible along this line, and the beginning of them goes back beyond the human stage.

A strong feeling of attachment to the place of birth is very common in the animal world, and it is associated with a sense of locality that is quite astonishing. It has been proved that animals taken far away from their homes find their way back with extraordinary sureness.¹ Horses in Australia always remember their birth-place, and go back there whenever they run away. Migrating birds are the most wonderful of the animals in this respect, as they travel far over land and sea to their usual summer homes in the north. Storks even come back to the same village and the same roof after several months' absence in the south.

We must credit man's ancestors with the same power, and we have therefore to admit that we civilised people have lost it; though the savage retains it to a very

¹ In the case of cats a thoroughly scientific series of tests has quite recently demonstrated the reality of the "homing" faculty. See an article in *The Scientific Monthly*, June, 1922, pp. 525-39.

great extent. The Australians show a remarkable sense of direction in places, such as the bush and the steppe, where the European is hopelessly lost, if he is left alone. The native has often been used, like a police dog, for tracking criminals. The dog, of course, is guided by smell, but in the case of the savage it is an acute power of observation that takes the place of smell. The savage can distinguish between the footprints of several different individuals. He notices little bits broken off the trees along the route of the fugitive. In the long journeys which primitive tribes made their sense of locality must have been severely tested. Probably climbing trees was a considerable help in finding the way home or exploring new regions.

(When we speak of primitive man as a nomad, it must not be understood to mean that he had no sense of home. We have already pointed out that the wanderings of Australian tribes are not aimless and irregular, but are undertaken for the purpose of sparing the game. We find, on close inquiry, that each tribe has its own region: that it respects the limits of the regions of other tribes and demands the same respect for its own. It is not fixed, but it is not homeless.)

(The settlement of a tribe in a particular spot was a long and gradual development. As they had no settled social institutions, no "villages," which begin with domestic cattle and agriculture, primitive men merely lived in small groups or families; sometimes camping in the open air, at other times huddling under a rock-shelter, or in a cavern, or in an artificial structure of some sort. Although, however, they had no "State" or "Constitution," the primitive nature of their houses—much the same as some animals use—did not prevent men from living together in large communities. In places the conditions were very favourable for the formation of large groups, especially where the forces of nature had left shelters of overhanging

rock, which would serve as roofs (Fig. 59) and protect them from wind and rain.)

Many districts in the south of France, especially the famous valleys of the Dordogne Department, have yielded remains of such settlements of the time of the Ice Age. Sea coasts with many creeks and low limestone cliffs to provide shelter give us, in Australia to-day, particularly in the neighbourhood of Sydney, a picture of such



FIG. 59.—PREHISTORIC ROCK-SHELTER (CRO MAGNON). (HAUSER.)

settlements; indeed they lasted in Australia until the time when the hand of Europe was laid upon the entire continent.

The animals themselves make use of rock-shelters in this way. In the tropics we find a wealth of animal life under every stone, sheltering from the rain, heat, and enemies. It is proverbial that the dragon lived in caverns. At all events, it is true of the carnivores

of the great Ice Age, as we know from their fossil remains, that they lived in caverns, and retired there with their prey. Many of them are known in science as the cave-bear, cave-lion, cave-hyena, etc. The raw climate at the time drove them into shelter.

The men of the Ice Age in Europe had the same experience. But "cave man" was not original. It is quite clear in many places that he secured his caverns from animals which already occupied them. It was only dire need that drove man into the darkness of the caverns. His general condition was, clearly, to use the overhanging rock-shelters—"half caverns," one might call them—which must have been used at a much earlier date. In the tropics and the south temperate zones such shelters afford a quite ideal home, especially when they open upon valleys or the sea coast, where plenty of food is to be had. We are, therefore, not surprised to find great heaps of shells in the idyllic stations which are scattered along the fiords of south-eastern Australia. Nothing could be more pleasant than these creeks, where nature has provided a home, with everything that he needs, for the naked savage: rustling streams, noble woods with plenty of kangaroos and smaller marsupials, and the sea, with its large stores of oysters and fish. The rocky roof sheltered him from the occasional, but rare, bad weather. Most important of all was the protection of his fire. The first real home was the fire-place under the rock-shelter.

The same picture is conveyed to our minds by the pleasant districts in the south of France where the remains of caveman are most numerous. Long before the Ice Age there had been mighty volcanic eruptions, and they had made many cavities in the Jurassic limestone of the region. It was these that provided man with a roof during the Ice Age. We find no interruption of the settlements. One layer of remains was heaped upon another, representing the successive generations,

until at last the rock-shelters were filled up. The sites were carefully selected. As Hauser has shown, primitive man in the Vézère valley only used the shelters which faced the south or the east. The coldness of the climate compelled him to take the sun into account.

(We must, however, not imagine that during the Ice Age the prehistoric Europeans always lived in caverns. There were also unquestionably, many artificial constructions, and we find these occasionally sketched amongst the artistic treasures on the walls of the caverns.



FIG. 60.—PREHISTORIC DRAWING OF A HOUSE ON A BUFFALO, FROM FONT DE GAUME CAVERN. (CAPTAN.)

Artificially constructed homes are one of the oldest possessions of the race; indeed, they go back as far as the common ancestors of man and the anthropoid apes. The apes show a good deal of skill in making sleeping places and roofs adapted to life in the forest. In their case the chief point is that they do not need to make any allowance for fire. This shows how extraordinarily primitive the custom is, and we accordingly conclude that it goes back to the early ancestors of the

Primates. The "nests" which the orang, gorilla, and chimpanzee make are curiously like those of birds, but less specialised and complicated. The tree-nest of the apes is very simple. Twigs are arranged on a strong branch of a tree, and the whole is covered with leaves (Fig. 26). The orang also covers itself with leaves. It has recently been reported that the gorilla does the same in some places (Heinicke). Some kinds of chimpanzees have the same habit; and it must have been even more practised by their ancestors, as they had better thumbs. Other chimpanzees make a sort of roof over their heads, and renew it every month or so.

A traveller in the southern Cameroons, J. von Oerzen (quoted by Sokolowsky, *Medizinische Klinik*, 1915, No. 22), tells how he found a deserted camp of gorillas. There were sixteen sleeping nests, nine on the ground and seven from four to six feet up amongst the branches of trees. "It is," he says, "impossible to infer the number of individuals from the number of nests, as one or other animal makes a number of nests before it settles down, but it is safe to say that there were at least ten individuals, which is more than a single family." The nests were transparent and rather small. Male gorillas, which are heavier, do not sleep in nests, like the females and children. They remain at the foot of the tree, ready to meet any enemies. We are told the same of the chimpanzees. Von Oerzen says that their nests are always on trees, at a height of sixteen to thirty feet. The ape puts a few twigs in position on a branch, then sits on these and reaches out for more. It never uses dead branches or dead leaves. The thickness of the nest depends upon the density of the tree. In a light tree it is transparent.

Gustav Schneider has recently studied the orang in Sumatra. He found the nests usually forty to seventy feet above the ground, and made in the fork of a tree. If the nest was on a free branch, it was higher above

the ground—up to a hundred feet and more. The nests are generally in more or less inaccessible places, on cliffs or even in marshes, and are like storks' nests; except that the interior is well filled with leaves. The orang does not break off the twigs near its own nest, but plait them together and forms a sort of evergreen natural roof, which conceals it. It begins to make its nest about quarter of an hour before sunset. The work takes about half an hour. The nests are, according to Schneider, only used for sleeping.

The huts of living savages rise, in various degrees, above this level. Cook, in 1777, found the Tasmanian aborigines living in hollow trees: apart from a few wretched huts, made of twigs and covered with bark, on the coast. The trunks of large trees, giving room for four or five individuals, were hollowed out by fire, and a sort of floor made of clay. One side of the tree was always left uninjured, so that it would continue to grow.

The Australian aborigines give us a very good idea of the beginning of shelters against the rain, and their methods vary a good deal according to the nature of the locality and the materials they use. In the thick bush, shelter from the rain is not difficult, but it is necessary to have some shelter on account of the heavy showers. The universal means, the primitive umbrella, is the leaf. Moszkowski tells us that in the thickets of Sumatra we find rudimentary huts made by putting a number of leaves together. In the beautiful woods of North Queensland palm-branches are bent together, in the rainy season, to make a sort of round hut; and the Botocudos of South America are said to do the same. In the flatter parts of Australia, with a thinner bush of gum-trees, round huts are made from the bark of the eucalyptus (*Eucalyptus melaleuca*). A small number of twigs, ending in a fork, are stuck in the ground, and other twigs are laid on them. The whole is then covered

with ox-hides, leaving an opening to serve as a door. As the supporting twigs converge above, the hut is domed; as is common amongst lower races, even when the hut is of solid material such as clay. There may be an opening at the top to serve as a chimney, but fire cannot safely be kindled inside the hut unless it



FIG. 61. - AN AUSTRALIAN WIND-SCREEN.

is fairly large. In spite of the inflammable material, however, the Australian aboriginals often make fires in their huts to drive away the mosquitoes. As a general rule, the round skin-covered hut is not suitable for a fire.

Concern about fire has developed other methods. The most important point is to protect the fire from the wind, and this is best secured by a screen made of

the same materials as the hut. Whether the hut or the screen is the more primitive, we cannot say; and, in fact, we must not in these matters think of an invention at one particular date. Simple matters of this kind must have occurred to the mind of man over and over again. Twigs are knitted together, and the openings are filled with leaves. Primitive as such a fire-screen is it has in it the rudiments of a new type of house—a walled house, with straight surfaces instead of a dome.

Of the ultimate product of this evolution, the four-walled house, there are at first only the fire-place and the wall. The rest is added gradually. The next stage is the making of a floor, an artificial foundation for the fire-place; and this must not be exposed to the destructive accidents that might happen, especially the action of water. Four equal-sized pieces of wood are stuck in the ground, as in the building of a round hut, and twigs are placed on the forked ends of these. The openings are covered with leaves, hides, or bunches of smaller twigs, so as to form a sort of “platform.” The basis of the fire-place is made on this with stones or earth.

The Australian aboriginals have not yet reached this stage of house-building, although they make platforms for certain purposes connected with their cult. The fire is never made on these platforms, however. It is always on the ground. Still, it shows that the construction of platforms must be a very old custom. It seems to be connected with the making of sleeping nests in the trees, as we find amongst the anthropoid apes.

Combining such a platform with a wind-screen, gives a structure that is not only the rudiment of a house, but it also explains another type of structure, the wide distribution of which in prehistoric times has been the subject of many learned discussions—the pile-village. It was found fifty years ago, first in Switzerland, then in other parts of Europe, that these pile-villages, which

are still built on the coast and in the forests of the Pacific Islands, the Malay Archipelago, Further India, the north of South America, and other places, were once used almost everywhere. There has been a good deal of admiration of the way in which so many advantages—protection from animals, sanitation, etc.—were secured by building houses on piles. All these reflections, however, started with the idea that men



FIG. 62. A PILE-DWELLING IN SUMATRA. (KOCH.)

first built four-walled houses on the level ground, and only later built on piles over water.

But, as Moszkowski rightly points out in his study of the evolution of the house in East Sumatra, we must not attribute these complex ideas to primitive man. The procedure was much simpler. There cannot be a platform without four supports, and it is obvious that in the wet forests a platform has to be made for the

fire. Moreover, as we said, the structure is connected with the arboreal habits of the ancestors of the Primates.

We see, then, that the house is found to have a quadrangular structure. That is a legacy from the pile-village stage. In the primitive forest-dwellings of the Polynesians and Malays we can trace the further stages of the process as far as the complete house. Even in central Europe we have many an opportunity, in mountainous districts (especially the Alps), of studying these earlier phases of the development of the house. The herdsmen's huts are stages in that sense. We have found the remains of similar block-houses which were used by the ancient inhabitants of our mountainous districts, such as Hallstadt, who have left us in their graves so many tokens of their culture and artistic sentiment.

The square pile-house is one of the many points of contact between Europe and the Pacific region. We can gather how deeply rooted in the past this type of house is from the fact that recollections of it lingered far later than prehistoric times. We have them, as Paul Sarasin has shown in his brilliant way, in the structure of the Greek temple. Sarasin regards the Greek temple as a "highly idealised and elaborated expression of the primitive pile-dwelling." He recognises the piles in the columns, and in the superstructure, which is now purely decorative, he sees the house which at one time rested on the piles. "The idea," he says, "will not seem so strange if we remember that in the earlier temples the columns were of wood, and that during the Bronze Age there were still pile-dwellings everywhere, even in Greece, not only over lakes and rivers, but on the land." The later practice of building houses of stone is only a reproduction of the structures formerly built with less solid materials.

The preservation of certain features long after the factors which account for them have ceased, is one of

the most interesting documents of man's cultural history, and it explains many things that we have found at places widely separated in time and space. As the race wandered over the earth, it took these traditions with it, and those branches which settled in the frozen north modified the older types of buildings to suit the climate.

The present inhabitants of the Arctic regions give us some idea of this. Wherever nature did not give them the protection of the rocks, they had to make an artificial substitute. Even tribes which habitually lived in caves were compelled sometimes, in the course of their hunting journeys, to fix up artificial constructions. A simple way of doing it is to make a hole in the ground. Combination of this "dwelling-pit" with the wind-screen, the round hut, and eventually with the pile-dwelling, gave a great variety of structures; and some of these explain a good deal at the level of civilisation. The earth-dwellings of many of the Siberian peoples are square. There is here, of course, no object in making a platform, yet parts of the older structure are preserved in the interior, the fire and the sleeping places being raised up above the floor. The furniture is part of the house. The raised parts along the walls, correspond to benches. The seat, bed, and table are, in a sense, a reproduction of the ancient platform. It is the same with the raised fire-place, the hearth. All other advances in the improvement of the house and its furniture are logical developments which are not difficult to understand.

When the house was evolved, it became a centre of social life. Moreover, the houses had to be built in groups; at least, from the social nature of the primitive people we cannot doubt that they were built near each other from the start. We find this even before any artificial dwelling-places were constructed. We have already mentioned the rock-shelters of the Australians at many places on the coast, but we have the same thing

on a larger scale in the villages of the Pueblo Indians of Arizona and New Mexico. *Pueblo* is the Spanish for "village," and these Indians had cleverly combined their "cliff dwellings" with the natural protection of the cliffs.

Every cavern is a natural fortress, and at all times, during war or other peril, the inhabitants of Europe have fled once more to the caves which were the homes of their ancestors during the Ice Age. There is a sort of imitation of the cavern in some features of later architecture. The building of stone walls, however, is not unknown to the Australian aborigines: not for protection, but semicircular walls on level coasts to let the fish into a kind of lake as the tide comes in. Yet the raising of large stone walls as fortifications is not unknown amongst the lower races. As there are such structures in the Caroline Islands, it used to be said that a higher race must once have lived there, but we now know that these fortifications were the work of the Micronesians themselves. Wandering races, which came from a region of caves, would naturally be disposed to imitate their old homes by means of stone constructions. We must add that in many cases these stone buildings may have been the homes of the dead, long after the living had adopted houses of quite a different type.

Another and similar way of obtaining security by means of stone buildings, was the combination of stone walls with some natural protection, such as steep cliffs. Possibly, early man retained his practice of building on heights from the old tree-climbing days, when his vision was so much extended. In the love of mountain-climbing we may see another relic of those early days. Apart from pleasure, the love of high ground remained in man for practical reasons. Even the sturdy Romans, who had otherwise no use for mountains, were very attentive to their military advantages. Their towers

and forts were raised on the top of hills; and, before the Romans came, the summits had been fortified by circular walls. We have ample traces of both British and Roman camps. They were the places of refuge of a great number of men: the early seeds of the agglomerations of houses that we call "towns," already found in an advanced stage when the historical tradition begins. The remains of the oldest cities are found in successive superimposed layers, the earliest going back as far as the Stone Age. They are mute witnesses to the social arrangements that had evolved since the time of primitive man, as the early nomads had settled down and taken to agriculture and the breeding of cattle. Vast is the distance, long the way, from the paradisaic condition of early man to the firmly compacted social structures of nations and States. We are, at all events, not without justification in using the word "paradise" when we reflect that war did not arise until the race had greatly increased. The struggle for life assumed a new form—the struggle of people against people—and in its way led to further progress. But the development of large communities involved some loss of freedom and significance to the individuals, a few of whom won a position of authority over the great majority. To this form of social evolution, the rise of authority, we now turn.

CHAPTER IX

SOCIAL EVOLUTION

WE have already seen that in the primitive condition early man had nothing corresponding to our ideas of social or political constitution. It is not very easy to imagine this rudimentary state of things, although we find it even now amongst the Australian aboriginals. We are too much inclined, on the analogy of more advanced peoples, to credit the Australians at least with "chiefs." Indeed, the colonists themselves have invested certain outstanding warriors with this dignity, and have—more or less in fun—given them the title of "chief," and even "king."

If we insist on comparing this primitive condition of the tribe with some one of our later political forms, we must, as we have already seen, call it an "oligarchy," or the rule of a few men who have special qualities, sometimes superior bodily strength. But their rule is as vague as their right to rule. Younger elements may sweep them aside, just as is done in a herd of animals. Amongst the latter the common subject of contention between the males, especially between the older and the younger, is the female; it is the struggle for life extending beyond the life of the individual. We have already recognised that sexual ornamentation is an outcome of this rivalry. In the case of man there has been no development of fighting organs as such because, as we have seen, the struggle does not in his case assume the extreme forms which we find amongst many of the lower mammals.

We must take these facts as our starting point in studying the history of human sexual relations. 'Marriage and the family are later stages of development, and there is no trace of them at the level reached by the Australians. Apart from certain peculiar traditional ideas, which represent an attempt to regulate the sexual claims of individuals within the tribe, there is merely the ancient custom of the rule of the stronger of the old men, who claim the young women for themselves. The entrance of the girl into sexual life is accompanied by acts of great sexual crudeness, as soon as the bodily signs of maturity are found in her, and it is the old men who take the chief part in this. The younger men, in spite of the traditions we have mentioned, find it very difficult to secure a woman; and, when they attempt to do this by a sort of elopement, their joy is of brief duration. They are subjected to the punishment of the duel, as we described it, and the girl is intimidated by very cruel treatment from ever renewing her attempt to fly. The stealing of women, nevertheless, occurs constantly amongst the Australians.

If we now apply this state of things, which we find within the comparatively narrow range of the aboriginal population of Australia, to the whole primitive race, as it surged into new regions, we begin to understand how the stealing of women was one of the factors in the development of monogamy. 'The main point of it is that only *one* claim is enforced upon one woman, as opposed to tribal marriage, in which the woman really remains common property. It is difficult to imagine any other primitive form leading to marriage except stealing; and this would also lead to the founding of new settlements in more distant regions, and to conflicts of the old and new communities with each other. Even amongst the Australians two different tribes often fight over a woman who has been stolen by a member of one tribe out of the other tribe. Woman was the main

cause of war long before the time of Helen of Troy; and indeed war is, in this respect, only a further development of the duel.

Following up the history of marriage as far as positive evidence will take us, we meet the idea of stealing everywhere. The historical side of the problem may be dismissed by merely referring to the rape of the Sabines. Even if this is not an historical fact, it is a good illustration of the position, and some such thing must have actually happened often enough. We have further evidence in the various customs during the marriage-ceremony. Even in the modern European form they often contain reminiscences of an earlier theft of the bride; as, for instance, the lifting of the bride over the threshold, the wedding breakfast (which is a sort of compensation to other men for the surrender of their rights), and many other details.

The idea of paternity only develops with marriage. In the tribe, where a number of men claim a number of women, there is no such idea as "father"; as one finds amongst the living Australians. This primitive state of things raises the question whether man is naturally intended for monogamy. To that question I would give a decided negative. Polygamy is the rule in the animal world, and the change from it depends entirely upon such factors as the strength of the men, to whom polygamy is natural and original. In the same way, polyandry is the primitive condition for the female members of the herd.

When one male in the herd succeeds in suppressing the others, and ruling alone, we get a patriarchal condition which in many respects suggests the idea of "family," and may be regarded as a second line of evolution of "marriage." The larger man-like apes, the gorilla and orang, seem to have reached this stage in virtue of their isolation. We often meet them as single pairs, or as one male with two or three females. This

is polygamy, it is true, but the number of wives is small. The marriages of the Jews of the Old Testament were at the same stage of development, each having a number of concubines in addition to his principal wife. The development of the harem, a state of secondary polygamy, comes next to this, and it leads us back forward the herd.

At lower stages of life polyandry is the inevitable condition of the women. Even where the older men keep jealous watch over the young women, they sometimes sell one, amongst the Australians, to other members of the tribe. Polyandry may, moreover, assume very large proportions as a result of a decrease in the number of females. We find this in a number of Indian tribes, in which several brothers are content with one wife between them. Scarcity of women is often due to the senseless custom of killing female children; but sometimes it is due to a disproportion in the number of female children born. Amongst some of the Australian tribes which are nearing extinction, the scarcity of women has led to homo-sexual practices which we should otherwise not expect to find at so low a level.

The traditions of the various tribes which, as we said, represent some attempt at regulation, include some very peculiar and complicated precepts, and these rather suggest that there is some anxiety to avoid the evils of inbreeding, which are very apt to arise when there is complete promiscuity in sexual relations. In the commonest case each tribe consists of four groups of men, which take different names. Let us call them *a*, *b*, *c*, and *d*. Each native knows exactly to which group he belongs, and the member of group *a* can only mix with members of group *b*. All the children belong to group *c*, and they can only have intercourse with members of group *d*. Then the children of these connections fall into group *a* once more.

The strictness with which the observance of these rules is required, and any transgression is punished, is

remarkable ; as we can scarcely suppose that the rules are dictated by a perfectly definite desire to avoid inbreeding. To know the mischief of long-continued intercourse between closely related individuals, would require an advanced acquaintance with the nature of the sexual process, and we do not find this at all amongst savages. As far as the Australians are concerned, all observers agree with the statement originally made by W. E. Roth, that they have no clear idea of the connection between the sexual act and child-birth. Their notions about the origin of the newcomer are very vague. Even allowing for the possibility that some of the more intelligent of them know better, and deliberately leave the others in ignorance, the situation may still be regarded as a proof that in the beginning men did not realise the connection between sexual intercourse and the 'birth of children. This stage of naïve innocence in sexual matters enables us to understand many ideas which long survived in the race.

The Australian woman believes that the child has just arrived in her body when she first feels it moving. But whence can it have come ? From somewhere without—from some animal or bird or lizard that crossed her path. Here we have the idea of the "soul" of the child entering the mother's womb : an idea that, in connection with the entire attitude toward the psychic life and especially the transmigration of the soul, ends in a complete recognition, amongst the Australians and other living savages, of the common nature of man and the animal. Hence the soul of the animal can enter a human body and (as we shall see) vice versa.

This recognition of the equality of animals is very important. In the childish tales told by the Australians the animal is always represented as thinking and acting as a human being does. The stories which the children of higher nations enjoy correspond entirely to those of adults at the Australian stage. It is also interesting

to note that the Australian always speaks of the animal's front paws as "hands," and never calls it a "quadruped." Their naïve ideas about the real facts are very striking. The very backward savage instinctively adopts at once the correct attitude toward the animal world which modern science is emphasising against the ignorant practice of attempting to separate man so widely from it.

This supposed common nature with the animals makes many other things intelligible. For instance, the names which human communities give themselves are closely connected with it. In many cases, it is true, the names of tribes and peoples simply mean such things as "All-of-us-together," or "All-we-men," and so on; but we often find them named after certain animals. Amongst the Australians the groups which are formed within the tribe, as we explained, are not infrequently named after animals: one group, for instance, is known as "the crow," another as "the cockatoo," and so on. It is well known how Indian tribes used to decorate themselves with animal names, and they were very proud of them. Even our Teutonic ancestors did something of the kind. In Zheruski we have the old Teutonic word for "goat," in Chatti the word for "cat," etc.

Relationship with the animals leads to a good deal more than taking their names. A deeper value is attached to it, and for the individual this has a special significance. This connection between an individual human being and a definite animal is easily understood when we remember that his soul is supposed to have come into his mother's womb from that particular animal. Properly speaking, the man thus belongs to that animal species, and he will have to take this relationship into account just as we do human relationships. He will not kill these "brothers" of his. It would be very wrong, and would, according to their ideas, bring upon him the vengeance of other relatives of the animal.

This is quite enough to explain the apparently mys-

terious connection which the North American Indians assume between a certain individual and a certain animal—the man's "totem," as it is called by the Algonquians. From this we get the word "Totemism," the title of a chapter of primitive history that abounds in controversy and absurdity. It would be a needless torture for the reader if I were to quote only a part of what scholars have said, with a great array of hypotheses, about totemism.

The simple explanation we have given is based mainly upon the data collected in regard to the Australians by earlier and modern students. Grey, for instance, found the word "kobory" used in West Australia as equivalent to the North American "totem," and the missionary Stretlew found it in Central Australia. According to Stretlew's observations it is probable that each individual has two totems: a personal totem and that of his mother, whose soul also had lived in an animal. From this they get a sort of family totem, which serves to link together all the children of one mother. If we use the word "family" at all at this low level, it must be understood as centring round the mother. There is at this stage no idea of a "father." The corresponding word in the Australian languages is given by the children of a tribe to all the older men; much as the modern Russians will call anybody "little father."

Thus the matriarchate (or mother-right) is the oldest form and stage of the family, as we still find amongst many savages, even amongst some which have advanced culturally far above the Australian level.¹ The entrance of the father into the family finds its expression in the peculiar practice, which we find over wide regions of

¹ It is proper to warn the inexpert reader that the theory of a general early matriarchate is not admitted. At various points of his able study Professor Klaatsch makes the mistake of taking the Australians as the most primitive known level of the race. We know several peoples (Tasmanians, Aetas, Veddahs, Yahgans, etc.) at a lower level; and these are generally monogamous. [J. M.]

Asia and America, and at one time even in Europe, known as the *couvade*: at the birth of a child the father goes to bed instead of the mother.

In this practice we have, in the main, an imitation of the behaviour of the mother by the man who wishes to be recognised as the father of the child. He gets all the care of a mother after child-birth and a good deal of meaningless trouble. I fully accept the interpretation of the *couvade* given by Bastian; it is to put in as strong a light as possible the fact that a particular man belongs to that particular woman and child. If the other theory—that it is a question of some magical ceremony for the good of the child—were right, we should expect to find the practice, or something like it, amongst the Australians. There is no trace of anything like the custom.

The idea of “authority” has its preparatory stages and vagaries like the development of marriage. In a complicated way it is evolved out of the primitive oligarchy we have already described.

In the tribe a number of traditional precepts, emanating from the groups of dominating men, are most carefully observed by the younger men and the women. The remarkable mystification that is used in this connection is found so widely amongst primitive peoples that we must grant it a considerable and general significance in relation to the early history of the race. With other things of this nature we find amongst backward peoples a very peculiar instrument. It is a crude implement for producing a mysterious humming sound to keep the women and children away from the old men when they are engaged in secret conclaves. To understand these strange methods of keeping off the uninitiated we must remember that amongst primitive peoples privacy is a much more difficult matter than it is amongst people who have houses with locks and bolts. Hence when the rulers of the tribe want to be alone, they set this

instrument going. It consists of a stick to which a piece of wood is attached by means of cords (made of human hair by the Australians), and the vibrations produced as it is whirled rapidly round give a humming sound at first, and then a rumble or roar. This "whirling stick,"

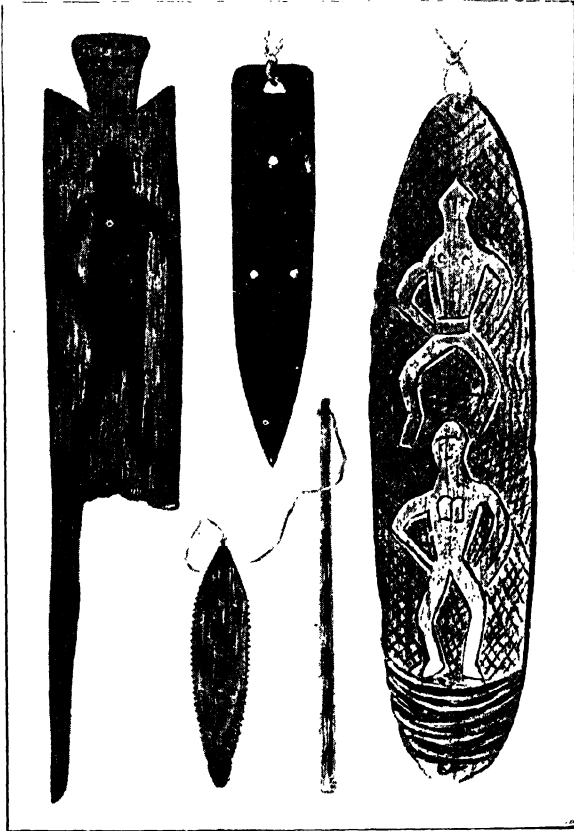


FIG. 63. — BULL-ROARERS (AUSTRALIAN (right), BRAZIL, ARIZONA AND ESKIMO).

"bull-roarer," is part of the culture of the most primitive race. We find it in Papua, New Guinea, Africa, and America, just as it is in Australia. In Germany it is still sold as a children's toy (the "forest-devil") in the fairs—a surviving relic of the childhood of the race!

In Australia disregard of the warning signal is inexorably punished by death. This shows how very seriously unwritten precepts must be observed, and how very little real freedom there is for the primitive savage in spite of the absence of a constitution. Mystification has clung to man from the beginning. For good or bad

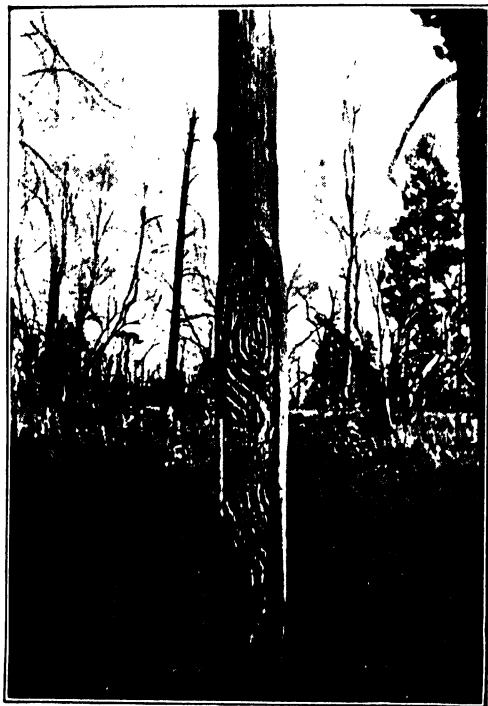


FIG. 64. MAGICAL CARVING ON AUSTRALIAN TREE

purposes the inherited tendency to form a secret society has always drawn together men who wanted to impose their will upon the majority.

Even to-day there is a nucleus of oligarchy in all forms of government, whether monarchic or democratic. At first, we suppose, it was bodily superiority that won the right to rule, but in quite early ages mental superiority

began to count, and it gave a special position within the oligarchic group to particular individuals. Here again the good and bad are mixed together ; for it cannot be denied that these more intelligent members of the tribe used their superior gifts in part to the prejudice of the others.* We find clear instances of this amongst the Australian aboriginals.

Men of this kind, of whom we find one or more in nearly every tribe, are best described as " magic-doctors." Like the " medicine men " of the Indian tribes of North America, their name does not mean that they really cure disease or can help suffering members of the tribe. In most cases they merely profess to be able to do so by using certain mysterious means and exploiting the credulity of their fellow men.

The great majority of the race has, in this as in other matters, so far retained the primitive frame of mind as to show a great deal of imagination in face of impending dangers, and the way to avert them. We may see in this a weakness that the member of the human herd has inherited from his ancestors. The liability to a " panic " reminds us of the rapid spread of outbreaks of fear without any tangible reason in a herd. Amongst the ungulates this herd-fright is, like all the other features of flight, pushed to an extreme ; but even the Primates have a good deal of it, as we see in the mixture of fear and bravery in the case of the monkeys.

As far as man is concerned, we must count a high degree of fear amongst the qualities by which we would explain many of the peculiarities of his behaviour. The solitary large anthropoid apes, the gorilla and orang, have clearly got beyond this stage of fear, and display the same courage as the leading males in herds ; and there can be no doubt that individuals of the primitive human herd had this courage, though it was not a general characteristic. And just as we find amongst gregarious animals that they frequently " lose their

heads" with terror, and bring on a disaster that might have been avoided by more sensible conduct, so we find terror growing to the pitch of madness amongst primitive tribes of men. It is only in this sense that we can



FIG. 65.—AUSTRALIANS PAINTED FOR CEREMONIAL PURPOSES.

understand a special feature that all observers have noticed in the Australians and other savage races—that they sometimes die from fear of death, or, more accurately, that imagining that some mysterious force

threatens them with death does actually lead to their death. Dr. W. E. Roth has given this the name of "thanatomania." The most curious feature of the delusion is that the threatening power is regarded as working from a distance, as a hostile force not in the immediate neighbourhood, but of deadly effect.

This peculiarity of the mental life of the Australian savages, established over and over again with absolute certainty, cannot be explained in any other way than that it is due to primitive man's ignorance about death; which is, after all, only the complement of his ignorance of the origin of the individual life. The cessation of life is to some extent intelligible to him when he sees one man strike another down with a weapon. In this case he sees cause and effect. The Australians call wounding, very expressively, in the childish English which they readily learn, "killing a little bit." Death is a matter of degree to them. When the wounded man falls unconscious to the ground, he is like a man asleep. Something, clearly, has been driven out of the body. This "something" is the soul, the distinction of which from the body is a self-evident matter to primitive man. He sees no sharp distinction between unconsciousness, sleep, and death. Although he does not fail to notice the cessation of the vital functions at death, he is never quite sure whether the departed something will not return to the body, as he sees it do when a man awakens from sleep. Unquestionably, dreams have a great deal to do with this, and we can trace more than one development to their influence.

We have more than once pointed out the influence which the stimulation of the nervous system during dreams has upon the imagination of primitive man. We have shown that before birth this stimulation alone is found in the life of the individual, so that for a time the dream-state is paramount, until the stimuli of the external world gradually make themselves felt, and

ultimately predominate. We may now make a very important inference from this simple fact: that for a long time the two kinds of stimuli of the imagination are of equal value and force, and that therefore the impressions and experiences of the dream have the same reality in the eyes of primitive man as the real events he sees when he is awake. We see this very clearly in the case of the European child. Dreaming is not merely a question of when the child is asleep. There are half-states in which the imagination—the innermost part of the mental life—acts without control, and so blurs the frontier between reality and unreality that children often say they have seen or experienced things when they have merely dreamed them. This often makes it look as if they were lying, but it is really a case of genuine difficulty of distinguishing between the internal stimuli—the imagination—and reality. Primitive man has the same difficulty. He almost always remains a child all his life long.

This is precisely the basis of the rise of some individuals, the magic-doctors, over the other members of the tribe; they recognise the limits of the real more clearly than the others, and they exploit the imaginative terrors of the others by pretending to be able to avert the threat of injury from a distance, or to have the power of bringing such forces into action.

The belief in the possibility of these actions at a distance probably arises in the imagination of primitive man, from seeing his fellows occasionally fall in a fit and die, just as if they had been struck with a weapon. The savage sees no visible cause. He supposes, therefore, that the blow came from a distance, from an invisible enemy. It is in that way that he interprets disease. Hence it is quite intelligible how the infectious diseases which the Europeans introduced into Australia—scarlet fever, small pox, even measles—and which decimated whole tribes with fearful virulence, were regarded as

actions from a distance. The connection between an infection and an outbreak of illness long afterwards (so many days or weeks, according to the period of incubation of the respective illness) is far beyond the power of primitive man's imagination. The Australians still refuse to believe that syphilis, which was introduced by the Malay pearl-fishers into the northern parts of the continent, has anything to do with sexual intercourse !

But even when there is an external and visible agency which injures or kills a man, such as the bite of a serpent, the fall of a tree, or a stroke of lightning, the aboriginal cannot get rid of the impression that in the long run there was a man behind it, and that his will directed these non-human forces from a distance. This assumption, that there are more or less personal forces behind the actions of animals and everything that happens in inanimate nature, is a fundamental element of the mental life of primitive man. In association with the inability to distinguish between reality and unreality, which we have described, and the high degree of timorousness, it opens up new aspects of the story of the higher achievements of the race.

But before we go into these and other consequences of this conception of the primitive mind of man, we must glance at the actions and importance of the magic-doctors. Although they have no sort of authority, they exercise a very considerable influence. They are generally men who in their expression have an air of craft and cunning. As a rule, they do not have any special marks of their trade ; though in a tribe of north-west Australia I found that the magic-man had a stick-shaped woven object in his beard, reminding one of the beards of many of the Egyptian and Babylonian statues. We do not know how a native comes to turn to the profession of magic-man. But as they are notoriously deceptive, they probably, if they feel that they have the gifts, elect themselves to the office—possibly

with the aid of others of the same way of thinking—talking the usual nonsense to the other members of the tribe.

The equipment is very simple in proportion to the very strong faith which the other tribesmen clearly have in their powers. It consists chiefly of small pointed stones, generally crystals. These are collected—or so they pretend—in very special localities, such as at the bottom of deep water; which suggests that mystical ideas which we will consider later, have some share in the matter. Not having any clothes, the naked conjurer uses the natural joints of his body—especially the elbows, arm-pits, etc.—for holding his stones.

When he is called to see a patient, he begins at once to make a mysterious examination of him, to find by feeling him the seat of the injury that has been done to him from a distance. At last, after a long and very grave manipulation, the other tribesmen standing round with strained attention, he pretends to draw his crystal out of the body of his victim, and shows it triumphantly to the others as the cause of the illness. As some degree of recovery always follows this treatment, it is clear that hypnotism was known in the very first chapter of human history. The great importance of the psychic element in bodily comfort or discomfort runs through the whole race. The miraculous cures of modern Europe go back to the roots of humanity; like the many other phenomena which show the old ideas of injuring from a distance or mental killing surviving until the Middle Ages, and even in modern times.

We need only mention the “evil eye.” The belief is not only found amongst many savage peoples, but it flourishes ineradicably amongst some of the nations of civilised Europe. Spitting at a man, also, is one of the practices which become powerful weapons through psychic force. Very probably the idea that there is something wrong in pointing at a man with the finger

is related to some of the methods used by the Australian magic-doctors to cure or to cause illness at a distance. The procedure is for the assailant to creep up as quietly as possible to the unsuspecting victim, especially in the dark, when the tribe sits round the fire, and stretch a pointed object of some sort toward the man he is to kill. A pointed bone is regarded as the most effective. If possible, it is a human bone, but in default of that the bone of an emu or a kangaroo may do. The object represents the point of some apparatus that is supposed to penetrate into the body of the victim.

The "death-bone" is manipulated in many different, and sometimes complicated, ways. It may be fastened to a cord of human hair, and this is often drawn some distance over sticks that are stuck in the ground, great care being taken that the hair cord does not touch the ground. At the end of the cord is a hollow bone, and this is imagined as a reservoir to receive the blood which is supposed to be drawn from the victim by the blow from a distance. When the magical performance is over, the death-bone is put back in its case and the whole is tied up with hair. It is believed that burning the apparatus will hasten or ensure the death of the victim. In other cases they are content with a piece of shell cut flat like a leaf; this is pointed, like a symbolic knife, against the victim, and it is ordered in words to cut his throat or slit his belly. As a precaution the magic-man bends and moves the instrument about between his thighs, so as to avoid swinging it too wide, which might injure other men sitting near the victim.

If the victim gets a suspicion of what is happening, he has two alternatives. He either tries to avert the attack by calling in a friendly magic-man—to ward off the foreign body which is supposed to be making for him—or he gives in, refuses to eat, and dies from the mental shock, believing that he is lost. If a man falls



FIG. 66.—AUSTRALIAN WIZARD; TRYING TO KILL A MAN AT A DISTANCE.

ill, though no magic has been practised against him, and dies, it is assumed that magic was the cause, and his relatives try to find out who was the "murderer at a distance." Here again the magic-doctors have to help, and they generally cast suspicion upon some man who is hostile to them. The methods of finding out the supposed murderer are extremely original. The chief method is to inquire of the dead man; he must give a sign. There is a reminiscence of this in the Nibelungenlied; when the murderer, Hagen von Tronje, approaches Siegfried's corpse, the wounds begin to bleed afresh. And just as in the old Teutonic world death alone could expiate a murder, it was the same in primitive times; and is, as a matter of fact, still the same. As soon as the murderer at a distance is detected, the dead man's relatives come for vengeance, and do not rest until the guilt is expiated. Thus "blood-vengeance," the vendetta, so widely practised amongst the Latin nations, is one of the primitive features of the race.

The material of the magic protects a man, and makes him important, just as sharp and effective weapons do. Hence the magic-doctors keep their stones and crystals very secret. They show them only occasionally, when they want to frighten people by the look of them.

From attack by means of these magic stones and shells to defence by the same means—to use them as what we call talismans or amulets—is an easy step. As a matter of fact, the objects are worn round the neck in Australia for this purpose. We need not add that this symbolical conversion of the ancient weapons for action at a distance into means of protection has lingered in the life of the civilised nations of Europe. The superstition has survived, although the original meaning of such objects has been entirely forgotten.

CHAPTER X

THE BEGINNINGS OF RELIGION

THE world of ideas, of strange weaknesses, of deductions so strikingly consistent in their very absurdity, which our study of the place of magic in the life of primitive man has opened out to us, has other, and farther-reaching, effects than those we have yet considered. Superstition has led us to the question of faith, to the question how religion arose in the mind of the primitive race.

The word *religio* is Latin, and it originally meant merely "connection": especially with reference to the connection which man seeks to establish with those objects or powers which are said to be "supernatural," or inaccessible to his intellectual faculties. We might put it that by religion we understand the attempt to find a solution of the riddle of existence. In this purely realistic definition religion represents an ever-changing structure, compacted of ideas of the most diverse description.

If, therefore, we venture, in a purely scientific spirit, to attempt to understand the origin of religion, we have to analyse the various and heterogeneous elements which have been put together to form a picture of a super-terrestrial world. It is a strictly logical deduction from all that we have yet seen to assume that at first man's ancestors had nothing that we should regard as religion. So much may be said with confidence at least about the lower animal ancestors. As regards the later animal ancestors of the Primates, there is always the possibility

that in their mental life there were processes that fall within the limits of our subject.

This division of human characters into those which came into existence before, during, and after the real making of man must be applied to mental, psychic, and moral qualities as well as bodily features. The objects of which we thus explain the origin are the various religions which we find amongst civilised nations as well as those of the lower races. There can be no question here of dealing with them singly. We have in a general way to explain the development of all religions which are characterised by a worship of gods or idols or one personal God. This last and highest form, with its moral attitude toward life, must serve as a test whether an evolutionary explanation of "religion" is possible.

As a matter of fact, the condition of the Australian aboriginals again gives us very useful material. A great deal of what we have already seen can be used in connection with the problem of the development of religion. We have already seen, for instance, how strong a belief the savage has in an unseen power, and that his childlike inability to distinguish between reality and unreality has very remarkable consequences. One is, as we saw, that the Australian cannot understand death. From this comes directly one of the most important elements of all the higher religions, the belief in immortality; which is, therefore, not to be regarded, as is so often done, as the laborious outcome of philosophical speculation. And in combination with the inability to see the causal connection between child-birth and sexual intercourse, the belief in immortality leads to the idea of transmigration, which we find carried to its ultimate consequences—the worship of animals as temporary vehicles of human souls—in the oldest of civilised nations, the Egyptians.

In order to explain the likeness of one person to another the Australians suppose that the soul of a dead man

has entered the body of a newcomer into the world. At one time, indeed, they thought that the souls of their own dead were found in the white Europeans. The fact that the pigment which gives them their dark colour is in the skin, and that corpses become light in colour as the skin decays, and the pigment is dissolved, confirmed them in this belief. Many an English convict or pioneer investigating the interior owed his friendly reception by the Australian tribes in case of need to the belief that he was one of their own people who had returned from the dead. Sir George Grey humorously describes, in the account of his expedition to north-west Australia (1837-9), how he was greeted as a son, and embraced, by an old woman.

The belief in immortality assumes a special and far-reaching importance in the case of those individuals who occupied a position of distinction during life, either as warriors or magic-doctors. Their power does not end with death. The survivors continue to fear them; the more anxiously, as no one knows the present habitation of their souls. Nothing seemed too wonderful to ascribe to the ghosts of these men, as even during life the magic-doctors had been credited with the power of visiting the camp at night in the form of an eagle and burying their claws in the bowels of the sleepers!

Hence when we find the Australians in a constant state of fear of evil spirits, we must not suppose that it is a dread of personified forces of nature. It is simply a question of the fear of men, of the dead, whose souls are imagined to be especially dangerous as they hover about in the dark. This fear leads them to propitiate the dead as much as possible; and this concern first expresses itself in care of the corpse. The soul might want to return to it, just as it goes in and out during sleep. So care must be taken of the body, and the soul must be induced to follow particular paths in case it returns.

The best means of doing this, to the mind of the earliest human savages, was that the survivors should eat the body of the dead man. If the soul then wants to return, it must enter the survivors. The advantage of this is that they will acquire the powers of the dead. Here we have the primitive nature and the cause of cannibalism. It is true that man-eating has been found in higher races, such as the Maoris, but that is due to a later modification of the old ideas; it comes partly of cruelty and partly of abnormal desires. At least, George Forster, who accompanied Cook on his second voyage (1772-5), very rightly doubted whether cannibalism in New Zealand was due to a scarcity of animal food; though we have a number of authentic narratives which show that hunger does at times lead to cannibalism. It has often happened in China, as Menzel shows in his *Kurzer Chinesische Chronologia* (1696). Cannibalism has at one time or other spread over nearly the whole earth; and prehistoric finds, especially at Krapina, give evidence of it in remote times.

"Eating the corpse" has a basis of real motives. There is a natural reluctance to lose beloved persons, and their bodies are eaten in order to keep their souls. The Australian never kills a man for cannibalistic purposes; but the mother sometimes eats the flesh of a dead and beloved child, and keeps the bones, coloured red, beside her. This is plainly done with the idea of still keeping the lost one near. On the other hand, when an enemy is eaten, it is for the purpose of obtaining his strength. When the whole body is not eaten, the fat near the kidneys, in which special properties are supposed to reside, is devoured. This idea of winning the qualities of others by physical means has survived in a superstitious form, and even in certain religious ideas. In this respect the Australian aborigines lend a very favourable ear to the teaching of the missionaries in regard to the Last Supper. They understand that Christ was a very

distinguished man whose flesh and blood they are to eat in order to become like him.

Another way of keeping the dead in a form that



FIG. 67.—MUMMIFIED CHILD OF NORTH AUSTRALIA.

corresponds as closely as possible to life is to mummify the body. The practice was, with the aid of certain spices (cedar-resin, etc.), carried to a high pitch of per-

fection amongst the ancient Egyptians. Amongst the Australian savages we find it in its crudest and most primitive form. The body of the dead is allowed to decompose until the external skin (epidermis) peels off. The body is then allowed to get thoroughly dry, and the process is assisted by putting it on a platform and lighting a fire underneath. The intestines are first removed. At least, I found this done in the north of Australia, though the first Australian mummy discovered, in 1845, and sent to Europe by Sir George Grey, had not had these organs removed. The apertures of the body (mouth, nose, etc.), had been carefully closed—partly sewn, and partly stopped up with emu feathers—as if to keep the soul inside the body. In northern Queensland, from which I brought a mummy to Europe, the aborigines have an unsavoury custom of smearing themselves with the fat and blood that drops from the body during mummification : again, clearly, with the idea of securing the qualities of the deceased.

After a time the body is ready to be treated. It is bent forward, and the knees are brought up to the head. The arms are pressed to the side of the head and tied with cords made from plant-fibres. The idea of this treatment is to chain up the dead. The real psychological key to the making of mummies is the combination of the two processes, conservation and tying-up. The dead is to be kept in a state as much like life as possible ; but, in case the soul should return to the body, it is to be prevented from moving about as it likes and perhaps injuring the living. The method of dealing with it shows that the mummy is regarded as equivalent to a living person. It is put by the camp-fire at night, and there are little ceremonies in honour of the deceased, during which the body is so placed that it can see everything. The mummy is prepared in such a way that it can sit up without support.

The mummy I brought from Australia was the body

of a great warrior, Narcha, a very important person of the tribe known as the Bunji. The gold-diggers, who had nearly exterminated the tribe, called him "king of Boonjic." I heard of the mummy, and got the diggers to take me to the natives, whom I persuaded to sell me their "king" and "father," for a few handkerchiefs and other things bought at a bush-store. Each of the natives bade farewell to the mummy by a sort of spitting on the bare skull. Roth calls this a "kiss," but the Australians (like most savages) do not kiss in the European way. The diggers advised me to hide the mummy, as the blacks would certainly try to steal it during the night. At all events they came next morning and asked for its return. They had had no rest during the night, and now offered two skulls for it. But I gave them further presents, and hurried away; and the mummy is now in the Berlin Academy of Science.¹

It is clear that in this process of mummification as practised by the Australians we have the survival of a very ancient combination of two phenomena which at higher stages of development are separate and apparently independent. That is why in learned discussions of the subject there is so much failure to see the meaning of it. One of these phenomena, the preparation of the mummy, goes back through ancient Egypt to the starting point of development. It has been proved that the oldest mummies are trussed as they are amongst the Australians, and that the recumbent position is later. The other phenomenon, the tying of the body, is a very common and widespread practice of lower races.

It has long been known that bodies preserved in this way were found in graves of the Neolithic Age, and are still found amongst the lower races of to-day. But experts were not at all agreed as to the meaning of it, and some very curious theories were advanced to explain it. For

¹ For a longer account and a full development of Klaatsch's ideas on the subject, see his *Die Todespsychologie der Uraustralier* (1911).

instance, the similarity of the doubled-up body to the position of the embryo in the womb suggested to some that the idea was that mother earth should receive her child once more into her womb. This seemed to find



FIG. 68. A NEW STONE AGE BURIAL. (KÖHL.)

support in certain practices of the Chinese, who make walls round their graves as symbols of the female pelvis. But it is impossible to credit the primitive intelligence with sentimental fancies of this kind. As Richard Anarse justly observes, "savages have quite

different, and much simpler and more natural reasons, for trussing the bodies." The real reason is a wish to prevent a "return" and free movement of the dead. Anarse has written a detailed study of the process as it is done to-day. We find it in the South Sea Islands, New Guinea, the Malay Archipelago, and the Andaman Islands. In India, in spite of the general vogue of the practice of burning the bodies, the primitive ceremony of trussing has survived, especially amongst the older (pre-Dravidian) peoples, who are in many respects very like the Australians. The practice is also very widespread in America and amongst the Eskimo. Amongst the Aleutians it is still combined with mummifying.

The practice even lingered until modern times in Europe. We find German ecclesiastical authorities forbidding the tying of the limbs and hands of a corpse as late as 1798, and Anarse reports the custom in Saxony. Even in 1901 the body of a tramp was found at Ziegenhain (near Jena) with the arms and legs bound with straw and the inscription: "we will make it impossible for thee to stroll about." In other parts of Germany the grave is dug very deep, or a heavy stone laid on it, for the express purpose of "keeping the poor soul in the grave." The handful of soil that are still sprinkled on the coffin originally had the same significance. The custom is clearly older than Christianity, as Horace says in his *Archytas-Ode*: "Thrice be earth strewn over me."

In recent years it has been found that the trussing of the corpse goes back to the Old Stone Age. The skeleton of an Aurignacian man found some years ago seems to have had the feet tied together. Many bodies buried in this way suggest the posture of a man in sleep, and they may be partly interpreted in this sense; but in the overwhelming majority of cases it is clear that the bodies were bound. Indeed, the anxiety of the survivors that the dead should not return was so great that they did not stop at binding the body. They adopted

other means, and sometimes these were substituted for binding.

Grave-stones, for instance, unquestionably fall into this category. They have not, originally, the pious meaning which modern civilised people read into them, but were at first intended to prevent the dead from rising and wandering about. The great heaps of stones in northern regions, which are the earlier phase of megalithic monuments, are of this nature, as Schoetensack has pointed out. An extreme development of the idea is found in the Egyptian pyramids, which are a colossal embodiment of the idea of shutting down the dead : as far above the naïve practice of the Australian aborigines as the complicated Egyptian belief in immortality and transmigration is above the child-like fear of the Australians. However lofty the tree may be, however, the common root is unmistakable. The learned priests of Egypt, who were so clever at duping the "profane crowd," were worthy successors of the magic-doctors of their ancestors as exemplified amongst the Australians.

Binding and mummifying the body are still practised in some parts of Australia. In other places there are indications of a process substituted for these. The deceased is buried, but his big toes are tied together and his nails burned, so that he cannot climb out of the grave. There were, and are, in Australia itself other methods of burying which seem to belong to a different order of ideas, yet—at least in one respect—are connected with the belief in immortality and transmigration, which we have described. Particularly interesting is the practice of burying in trees, which is still widespread in the north-west of Australia, and was once much more common. It is the antithesis of the binding method. As the body is allowed to moulder in the open air on a tree, the soul is enabled to pass quickly into some other being. The eagles, which are as numerous in that part of Australia as crows are in Europe eat the flesh and

thus, as the natives believe, take the soul of the dead into themselves. From them it can easily pass into the body of a woman, according to their view of child-birth, which we have seen previously.

The apparent contradiction between these two methods of dealing with the dead is solved by the simple reflexion that there have always been great differences in the attitude of the living toward the dead, the return of some being ardently desired and of others dreaded. This would explain the entirely different method of disposing of them.

The doctrine of reincarnation gives us further parallels between the Australians and the Egyptians. There is a threefold division of the idea of the soul: first for the soul living in the body, secondly for the period after death until it enters the animal which is the intermediary of its transmigration, thirdly for its entrance into a woman's body. I learned the names for the two stages between death and rebirth amongst the north-west Australian tribe of the Niol Niol. The soul of the dead which has not yet found rest in an animal body is called "Njer": in the condition of rebirth it is called "Ra-i." The missionary Strehlow found that the Arunda of Central Australia have "Ra-tape," which agrees very well with "Ra-i," for the latter stage. It is the more remarkable as the Egyptians used the word "Ka" for the soul before birth; and Samuel Laing, in his *Human Origins*, compares this with "Kra," a word used by the blacks of the Gold Coast with the same meaning. These African blacks also clearly distinguish three phases, as was a common practice of the Egyptians and Australians.

From all this it follows clearly that the child-like ideas of so primitive a people as the Australians still are were the starting point of the development of the religious systems of more advanced nations. There are two points that can and must be considered together

in this connection: first, the question how the belief in gods arose, and, secondly, the study of the way in which ethical ideas came to be connected with religion.

As is clear from what we have already seen, we have here a combination of ideas that are not necessarily associated with each other. Without some belief in gods religion, in the generally accepted sense, is impossible, and so the Australians have no religion. But their ideas plainly contain the germ of the further development. Indeed, one cannot fail to see that one can pass from their level to that of the most advanced religions by adding the belief in a personal god.

When we analyse the idea of a personal god we recognise that man has unconsciously imported a good deal of himself into his idea of God. In what other way could personality be judged except on the human standard? The anthropocentric point of view—the placing of man at the centre of all things, even supernatural—is quite unmistakable. When we find God represented in the Old Testament as acting and feeling in a human way, we have clear evidence of a lower stage in the development of religion. It is a primitive god, a vindictive god, one whose work occasionally fails; and it is not such a very long way back from this to the Australian level. As the Australians regard everything from the human point of view, and think every event must be an outcome of human power, the *personal* element is extraordinarily important in their lives. When an Australian meets with an accident—a serpent bites him, or lightning strikes a tree—he does not think of vague forces, but of definite human beings, as having done the deed. When he dreads evil spirits in the gloom of the bush, he means that souls in the “*njer*” stage are hovering about and may do him an injury.

This means a very important relation between definite personalities and the manifestations of natural forces. For example, if a redoubtable fighter dies, and the survivors

are uncertain of the whereabouts of his soul, and a heavy storm comes on, they believe that it is the voice of the dead man they hear in the thunder. The streaks of lightning are the fiery spears he throws. If another dead man is at some other time or place regarded as the cause of the natural phenomena, there is still a personal connection. In each case the dead savage plays the part of the god of thunder and lightning. Thus the savage's childish fear of the soul of some dead warrior or magic-man is an embryonic stage of the fear of God in the higher religions.

There are all sorts of stages possible between these two extremes. The supernatural powers that are ascribed even to the living are the starting point. The higher the repute of the man was during life, the more his arm was dreaded, so much the greater god he is after death. Every tribe may have originally had its own gods; and they were gradually thinned until only one of overwhelming significance remained. Even the god of the Old Testament is not without national characteristics. He is "the God of the Jews," it is said repeatedly. Had he been from the start the god of all men, he might be charged with injustice to the majority. But he fights just like a man for his own people against strange gods such as those of the Egyptians. These are regarded as inferior because they have no personal relation to him. Hence the quite logical idea that "idols" are so many degenerations of the idea of God. It is only a personal god that can communicate with the living to the advantage of the tribe or people. He alone can know the needs of individuals, and keep them from harm. Thus we reach the association of the idea of morality and of "sin" with the idea of God.

On the theory, which was once generally accepted, that men had personified the forces of nature, it was not easy to understand the punishing power of a god. All sorts of additional hypotheses had to be introduced.

On the view we give here, which puts the personal element in the foreground, the relation between God and man is perfectly natural and logical. As we have already explained, the moral ideas of primitive man are identical with his social ideas. What is good for the tribe is good, what hurts it is bad; as it was in the earlier days of the herd. The older men, the tyrants of the oligarchic groups, watch over this herd-morality, and the younger men are, generally after severe trial, initiated to the group. These men were greatly dreaded during life, and they are still more dreaded after death. It is no wonder that, when anything is done in contravention of the traditional precepts, the dead elder expresses his opinion in the thunder, and devotes the delinquent to the fate of death from a distance. The angry god is at first more conspicuous than the benevolent; as was the case amongst the Jews. Thus, according to the new view, the idea of punishment became associated with the idea of God.

The idea of a common home of men after death, with reward and punishment—the idea of heaven and hell—is not primitive; nor is the idea of the devil. All these ideas are accretions, a rich overgrowth, upon the originally simple belief in a personal god.

One advantage of the new view clearly is that it enables us to proceed direct from the primitive level to the highest stages, and to regard a large number of religions as divergencies, secondary modifications: like animal forms which have deteriorated in their organisation from the original level. This is the proper view, as we said, of religions of idols, which put some lifeless object in the place of the living personal God. Here again the Australians show us the beginning of a development that culminates in the fetishistic worship of many of the African peoples.

Amongst the Australians we find stones and blocks of wood which have quite an intimate relation to the

belief in souls. They were examined by Spencer and Gillen in Central Australia and by the author amongst the tribes of the north-west. These pieces of wood, shaped into long flat boards, and often covered with rather good ornamentation, are clearly considered as representatives of personalities. It is very difficult to ascertain

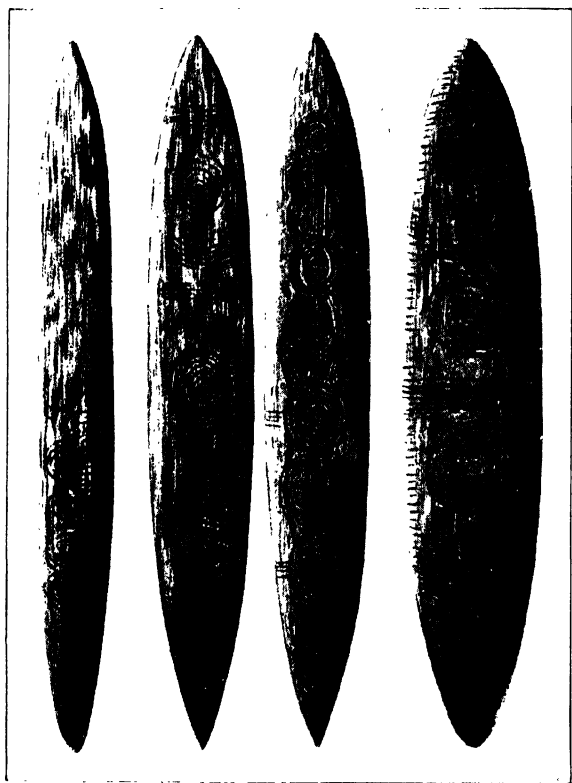


FIG. 69. AUSTRALIAN "CHURINGAS." (EIFFLER.)

the real nature of these objects ; in fact, up to the present no one has done so. W. Fay calls them "soul plates." They are carefully hidden away in such places as hollow trees, and nervously watched. As women are never allowed to see them, they must have something to do with the secret proceedings of the old men. The women

are ignored entirely in everything connected with souls. There is no interest except in the fate of the souls of the men. In Central Australia the sacred piece of wood is called the "churinga," and it is the best name for general use. It seems that each individual has his *churinga*; in fact, as I found in north-west Australia, sometimes two, a large and a small one. But what the objects mean is still uncertain. Certainly they are treated in a way (red colour rubbed into them, conveyed to other tribes which are sometimes permitted to see them, etc.), which suggests that they are regarded as representatives of men: a fact that is not unimportant in connection with the origin of fetishes. A very little more, and the *churinga* of a dreaded dead man will receive divine honours.

The idea of the amulet also enters the matter, as there is some connection between the *churinga* and the bits of shell worn for the purpose of magic or protection from magic, just as there is between magic and worship. In order to injure or kill at a distance the Australians use the method of making a sort of doll to represent the person who is to suffer: a custom that prevailed nearly everywhere until the Middle Ages, and is not yet quite extinct. One is tempted to think that this may be the beginning of idols. The idea of pleasing or conciliating the gods by sacrifices is plainly not primitive. There is no such attitude toward the dead amongst any of the Australian tribes. The personification of natural forces, such as the sun and the moon, is also a later development. .

The religions of the classical nations of antiquity, with their crowds of gods and goddesses, are special developments of the human mind along the line of mythology. Stories about natural phenomena without any ethical implications, naïve parallels between the movements of the heavenly bodies and movements in the animal world—these things are not really religion.

At the most, they are amongst the elements which are built into the intricate structure of many religious systems. Here again we find the rudiments of them amongst the Australians in the shape of a number of childish beliefs. When the savage is pressed by inquisitive whites, he—probably expecting some tobacco or other gift—often tells a lot of perfectly childish stuff that is sometimes taken quite seriously by missionaries, if not by more learned inquirers. In all this, however, there is a nucleus of genuine native ideas of the most naïve description about natural phenomena, without any connection with fear or soul-magic.

In the Milky Way, for instance, the savage recognises the smoke of the camp-fires. He compares the moon to a man who secures a good deal of prey at one time and so waxes fat, and at other times gets little to eat and grows thin. The setting of the sun and moon is compared to animals creeping into their underground burrows. But there is no trace of worship of the heavenly bodies, although the blessings of the sunlight are certainly just as much appreciated by primitive man as by the animals. For this human nature is not necessary, and for that reason we take the relation to the sun to be one of a series of phenomena which were very important as regards feelings of pleasure and displeasure even in man's animal ancestors. This brings us to a new source of impressions and ideas which passes into the history of the race from the pre-human past and has contributed material to the structure of religion.

That the savage greets the rising sun with joy we cannot fail to see. Its light and warmth are grateful to him after the darkness and cold of the night. But there is no material difference between the savage greeting the rising sun and the song of the birds at dawn. Neither can be called an act of worship; or else both must be so called.

{ Another very interesting example of ancient impres-

sions from the pre-human period surviving in man's mental world is the case of the serpent, which has had a quite special position in religion up to the very highest stage. It is conspicuous even in the Biblical narrative of the creation. Every thoughtful person must ask how this rather repulsive creature comes to occupy this position in the venerable story of Eden, and is even made to thwart the plans of the Creator. In harmony with the mosaic nature of the whole early part of *Genesis* we may see in it a fragment of some older legend; and, as we now know that the serpent was a sort of divinity even in such civilised religions as the Babylonian, this is put in a new light. We find the dread of serpents and dragons in the mythologies of nearly all peoples. There are parallels to "George and the Dragon" in the legends of many nations. Throughout the whole of Australia, in particular, there are stories told of a great serpent, living in the water in lonely places, as I confirmed during my investigations there. "Wollungua" and similar names are given to this fabulous creature. No native eye ever saw it, but all are sure of its existence. It is agreed that this serpent is the only being that can be said to be regarded by the natives as a super-human being: not a friendly, but a threatening, power, against which similar means must be used as against magical killing.

The natives draw a picture of a large serpent in the sand, and then thrust a spear into it. Only the magicians will go near a pond in which the creature is supposed to live, and they often say that they get their magical stories from the depths of this pond. There is, especially, a lake in the mountainous district of the coast of north Queensland which the aborigines believe to be the seat of a monstrous serpent. It is a volcanic lake: the crater of a volcano that was active in the Tertiary Era. Curiously enough, the natives say that once the earth opened there and the serpent crept out and devoured

men. In other parts of Australia also there are legends which suggest earlier volcanic activity in the mountains. The rainbow is regarded as a reflection of the serpent, or as itself a serpent; and credible witnesses, the first colonists of the locality, tell us that the aborigines threw their boomerangs at the rainbow in order to kill the serpent.

The dislike of serpents is quite natural in view of the harm they do in many countries, but there must be some special ground for this peculiar hostility. There are great numbers of poisonous serpents in Australia, and in the case of some, such as the Death Adder (*Acanthophis cerastinus*), the effect of the bite is fearfully rapid. To show what part is played by poisonous serpents even in climatic conditions which are not favourable to the spread of them, and as late as the higher stages of culture, we may point to the significance of the stork. Its mystic connection with the home is mainly due to its habit of killing serpents, and so protecting the family. The legend of storks bringing babies seems to be due to their annual migration to Africa and the fact, recorded long ago by Herodotus, that there are "little men" (pygmies) in the interior of Africa.

But this natural fear of serpents is not enough. The serpent is a representative of its race: the reptile as opposed to the mammal. It is a remarkable fact that all mammals have an extraordinary instinctive dread of all reptiles—not merely poisonous reptiles. With an astonishing correctness in judging their reptilian nature, the higher mammals—it is particularly noticeable in the case of monkeys—shrink from even harmless creeping things like lizards, blind worms, and tortoises. There can be no doubt, then, that in the pre-human stage our ancestors shared this fear.

This curious phenomenon is explained by a study of the evolutionary history of the two great branches of the land vertebrates and their relations to each other.

In spite of their meeting at a common root, the two lines of development are very different. That which culminates in the reptiles had an enormous growth very early in the story of our planet, the Secondary Era,



FIG. 70.—THIGH OF THE GIGANTOSAURUS.

whereas the mammals occupied a very modest position during that era, and it was not until the Tertiary that they attained the great development which made them superior to the reptiles.

The long struggle of the two great classes of vertebrates

is not known to us in detail; but we have evidence enough that there *was* a fearful struggle. Thus the monkey's fear of reptiles falls under the same heading as man's fear of dragons; both are reminiscences of the struggle of the mammals against their powerful enemies. That man as such can have had any knowledge of the gigantic monsters of the Secondary Era, remains of which have been found in America and East Africa of enormous proportions, is out of the question. But the ancient struggle had left such deep scars that the effects of them have come down from pre-human ages right into civilisation. Here the old dread and instinct to fly, which have been imprinted so deeply on the brain, came into contact with natural phenomena of a different kind.

Both volcanic phenomena and glaciers have to be considered in this respect. Streams of lava would very easily give the idea of great, serpent-like monsters. But, old legends also show that glaciers were often associated with dragons. Even to-day we find traces of this in the popular language of the eastern Alpine districts. When a glacial stream ravages a district, it is said that a "dragon" has been "let loose." Possibly even the legend of dragons guarding treasure may be explained in the sense that sometimes glaciers, as they advance, bury the sites of earlier mines. Siegfried the dragon-killer may represent the victorious power of the sun which forces the gold-guarding Fafnir (the gigantic dragon) to retire.

These suggestions are just a few glimpses of the ideas inherited by the primitive race from pre-human ages. The religious structure compacted of so many elements is intimately connected with the last and highest developments of man's powers. Originating in the mere terror of the herd, ethics has gradually become a new and higher branch of human activity, leading to a fuller knowledge and appreciation of laws that are

in themselves independent of man. From level to level, with many reverses, the race has climbed. In many respects the classic races of antiquity present periods of decay ; but on their ruins the northern peoples, who had lingered at a primitive level, raise a new structure of civilisation.

CHAPTER XI

THE OLD STONE AGE

UP to the present we have attempted to give a picture of the beginnings of human culture generally by combining material which we gather from a number of different sources. These sources are observation of the lowest living representatives of the race (generally called "savages"), study of the condition of those animals which are most closely related to man, and the documents which we recover from the soil of Europe, telling us the life and habits of the primitive men who settled here tens of thousands of years before the great Ice Age.

We must, of course, assume a link of physical relationship between the various beings who are thus quoted as witnesses to the cultural side of man's development. We have already, in previous chapters, studied various aspects of this problem, the solution of which will throw light upon the position of the anthropoid apes in relation to the various races of men. In particular, we stressed the very close affinity of the larger man-like apes—the orang, gorilla, and chimpanzee—to man; pointing out, however, that these apes must not be regarded as ancestral forms, but as more or less degenerate cousins of the more successful human family. No doubt this retrogression of some branch or other from the primitive root occurred many times independently. At all events, it led in the Asiatic world to the orang, and in the African region to the gorilla and the chimpanzee.

This separation into eastern and western types is

entirely in harmony with the fact that a similar division has recently been recognised in the human family, both as regards living races and the primitive representatives of our race whose fossil remains we find in the soil of Europe. We must now develop what we have said on this subject, and consider more closely the two types



FIG. 71.—THE PREHISTORIC SHELTER AT THAYNGEN.

of fossil European humanity, the Neanderthal race and the Aurignac race.

The study of the early fossil remains of man in Europe is confined to the last few decades. We had to wait for the development of modern geology to provide the methods of research by means of which we could confidently determine whether fossils were of great antiquity or not. The difficulties to be overcome will be realised when we say that in the course of long ages

the ground has been disturbed over and over again, and also that the remains of a man who had lived in a late period might come to be buried in strata containing the fossils and other relics of a much earlier period. These disturbances of strata have often been observed, and they have frequently led men into error. It is, therefore, always necessary to examine very carefully whether the deposits in which we find human remains are undisturbed, or if they have been subsequently disarranged. This is particularly necessary in the case of finds in caverns. As they were the homes of the primitive hunters of the Ice Age, they are very good spots in which to look for fossil or cultural remains of the time. But these caverns have been used over and over again by different generations of men; and they were, moreover, often preferred as burial-places. On account of the imperfect methods used in the early years nearly all the finds of human remains before 1880 are scientifically unreliable and must be regarded with reserve; unless there are certain anatomical characteristics of the bones which make it quite clear that they belong to a primitive race of which we have independent and confident knowledge.

Apart from disturbances, a deposit can be chronologically determined by the objects contained in it—cultural relics as well as fossil remains of animals. Thus when we find metal implements in a deposit, we infer that we are dealing with one of the latest deposits, because a knowledge of the use of metal mainly falls within the historical period; in central Europe, at all events, it only goes back a few thousand years before the Christian era. If there are no pieces of bronze or iron at all, but merely stone implements, we obviously have a deposit of the Stone Age: the time when man had only stone tools to shape his wooden weapons and to kill and cut up animals.

The Stone Age differed in different parts of the heart

as to the time it lasted. In many places, such as Australia, it still continues. It is, therefore, a question of relative not absolute, figures. In most places the Stone Age is older than the Metal Age. But in comparing a number of regions, a Stone Age relic, say, of ancient Germany

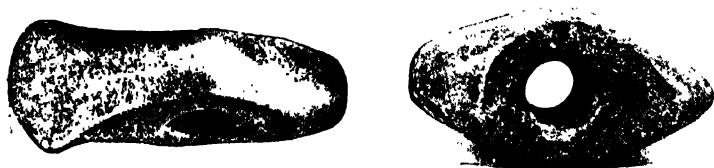


FIG. 72.—A NEOLITHIC AXE.

may be more recent than a piece of bronze from ancient Egypt, because in some places—north Europe, for instance—the Stone Age lasted longer than in others (such as the Mediterranean region).

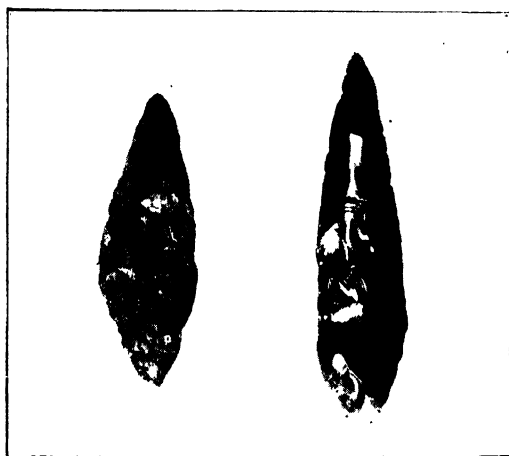


FIG. 73. — SOLUTREAN (left) AND NEOLITHIC
ARROW-HEADS.

{Relics of the Stone Age, in turn, are divided into earlier and later. To some extent the difference is in the making of the instruments themselves. It is only in the later deposits that we find artificially polished stones or implements with a circular hole bored through

them. Such objects are just the same in ancient Europe as in the South Sea Islands to-day. Some of the Australian implements are intermediate and show a rudimentary stage of polishing.

Confining our attention to Europe, the finding of an article of this sort shows that the deposit belongs to the New Stone or Neolithic Age (Greek *neos lithos* = new stone), as distinguished from the Old Stone or Palaeolithic Age (*palaïos lithos* = old stone). How far back the Neolithic goes we cannot say. It is impossible to assign



FIG. 71.- NEOLITHIC POTTERY.

definite limits. Indeed, there is always something arbitrary about such classifications. We can do no more than say in a general way that the Neolithic Age in Europe stretches back many thousands of years—the tendency at present is to say about 10,000—before the birth of Christ, and that in the later period of it at least man was in possession of agriculture and domestic animals. He had, moreover, made a further discovery of great importance in his life—pottery. Man of the Old Stone Age had not baked earth into vessels for holding

liquids. So far throughout this work we have not said a word about agriculture, cattle-rearing, or pottery. It is very important to understand that these belong to a later and higher level which the Australian has not reached. Man in Europe certainly did not reach this stage until after the Ice Age. Whenever we find bits of pottery, we can, quite apart from the stone implements, conclude that we are dealing with a deposit at least later than the Ice Age. Other marks of the recent nature of a deposit are the bones of domestic animals—the dog, sheep, goat, and pig.

Apart from polished weapons, the stone implements themselves are not enough to date a deposit, as, to a certain extent, the same types continue from earlier to later levels. Even the most primitive, the “Eoliths,” are found in later periods alongside the better implements. The Eoliths of the now extinct Tasmanians show us the varied uses that might be made of these crude implements. The Tasmanian’s “terowatta” was a universal instrument, serving for all the daily needs. There was no specialisation. One stone was used for cutting, scraping, hacking, hammering, and boring. It was used for making the wooden spears and other missiles, cutting meat, climbing trees, cutting women’s hair, or making the ornamental scars. No doubt the Eoliths of the primitive European were used in the same way.

The Old Stone Age is coextensive with the existence of the race on the earth, but there were various stages in it; and they are clearly defined as far as Europe is concerned. In other continents the distinction is not altogether applicable. Although stone implements of the same form as those used in Europe are known in Asia and Africa, the soil of these continents has not yet been sufficiently studied to enable us to fit these implements into the general story of the race. Even in Europe any attempt to distinguish different phases

by means of the instruments themselves must be made with great caution.

The French experts of the last century, who drew up a precise scheme of stages, thought that it was possible to name periods after certain forms of instruments. However, the idea which was the basis of the extreme classification adopted by Gabriel de Mortillet—the idea that the men of any particular time used only particular types of implements—cannot be sustained. Older instruments remained in use when new ones were developed, and the change was not likely to take place all at once over a considerable region.

More recent authorities have attempted to extend the French division of periods to regions outside Europe. These strained attempts at classification lose sight of the evolutionary point of view, to which one ought always to adhere in considering the spread of the race over the earth. Higher and lower stages of culture have always existed simultaneously, and often not far apart from each other. Just as animal types have survived in some places and been extinguished in others, so there would be differences of culture existing at the same time in different sections of the human race. This is strikingly illustrated wherever white colonists settle amongst aboriginals. When we understand Mortillet's scheme in this sense, we get a rational position. The various stages which he distinguished were named after the places in France where the first considerable finds were made: a method which prehistoric science borrowed from geology. The names retain their historical interest, and, when we take them in the broader sense and with the limitations we have indicated, it is as well to continue using them.

Mortillet regarded as man's earliest implement an object which we now regard as in quite an advanced stage of development. This is what the French call the *coup de poing* (Fig. 75), the "hand-axe." It is so

named because it fills the hollow of the hand (having no handle). It is an almond-shaped object, both of its convex sides being entirely worked by chipping. The first place where this was discovered was a small village near Paris named Chelles, where the deposits contained numbers of bones and teeth of elephants and rhinoceroses. The period to which the instruments belong was therefore called the Chellean Period.

Similar, though sometimes smaller, objects were found in the valley of the Somme, in the north of France,

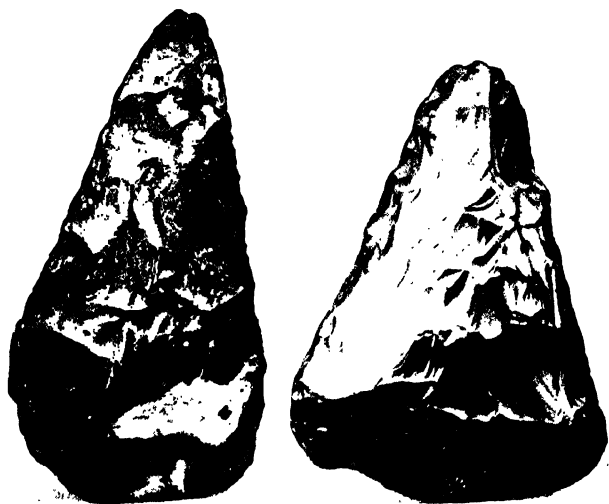


FIG. 75.—THE ACHEULEAN HAND-AXE.

at Amiens and Abbeville : a classical spot in the study of man of the Ice Age. It was here that Boucher de Perthes worked for fifty years during the nineteenth century, digging out his proofs that man had been a contemporary of the great extinct pachyderms : a view which then met with the most violent opposition.

Mortillet gave these smaller Chellean-like objects the name "Acheulean," after St. Acheul, a place in the Somme valley. Under the same title he included other implements which were found there : for instance certain knife-

like flat implements with a smooth flaked surface on one side, such as one gets by striking a segment off a block of flint, and the other side chipped.

The third place of finds to be immortalised in Mortillet's scheme is in the south of France : a place that has become a classic in prehistoric science. This is the Dordogne Department. The Garonne, with two sources, the Dore and the Dogne, which provide the name of the Department, flows from the highest part of the volcanic central tableland of the Cantal. There is a smaller stream called the Vézère, which has made a very winding bed for itself through a plateau of Jurassic limestone, at a time that

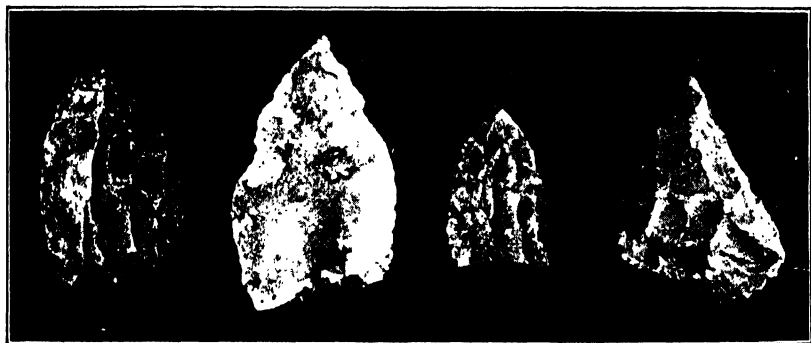


FIG. 76.—MOUSTERIAN IMPLEMENTS.

we must put about the beginning of the Glacial Period. Probably it was the melting waters of local glaciers on the central plateau, which used to be higher than it is, that curved the river's bed, and it then remained unaltered throughout the Ice Age. Otherwise we could not understand how the Vézère valley, with its eroded over-hanging rocks (*abris*) and grottos, became and remained one of the chief seats of Paleolithic man.

The immense treasures in the shape of Paleolithic remains that are accumulated in this valley were first opened up in the sixties of the last century by Lartet and Christy. They investigated a grotto known as

"Le Moustier." It was upon the remains and stones found here that Mortillet based the name "Mousterian Period," laying stress particularly on certain small instruments of a long and almost triangular shape—"Mousterian points"—which, like the St. Acheul type, have only one surface marked (Fig. 76).

The fourth place of discovery that concerns us here is near Macon, not far from Lyons. At this spot there is a hill which rises gently on one side, but it is nearly vertical on the other. At its foot is the little village of Solutré. There are here enormous quantities of horses' bones from the Glacial Period; the skulls are

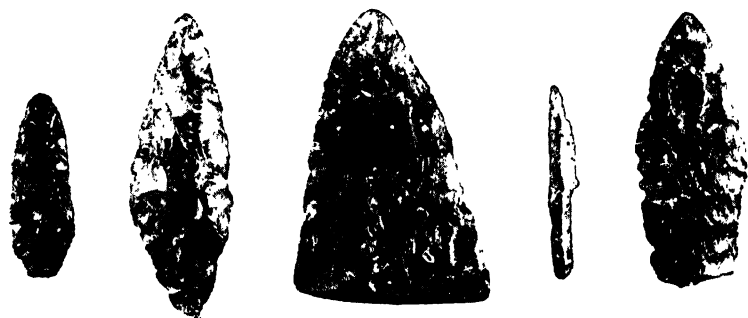


FIG. 77.—SOLUTREAN IMPLEMENTS.

broken open, showing that the warm brain was regarded as a delicacy by the ancient hunters. One is not very imaginative in supposing that they drove the horses over the hill and made them kill themselves by the fall. Perhaps they were themselves on horseback as they brandished their spears, the points of which we may recognise in the peculiar, laurel-leaf shaped objects, elaborately worked on both sides, of which we find large numbers amongst the remains of the horses. From these Mortillet gets his "Solutrean Period." He might just as well have taken the Vézère valley, as similar objects have recently been brought to light there by Hauser's excavations in the "Langerie intermédiaire."

The last of Mortillet's titles is also connected with the Vézère valley. A steep cliff near Le Moustier, close to the bank of the Vézère, bears the ruins of an old castle which is known as "La Madeleine." Under the shelter of this rock-cliff Lartet and Christy discovered the first specimen of the artistic work of the men of the Ice Age, in the shape of a drawing of a mammoth on a plate of bone. The instruments associated with it were small fine knives, often of very delicate and careful workman-



FIG. 78.—MAGDALENIAN IMPLEMENTS.

ship. Upon these Mortillet based the "Magdalenian Period" and type of implement.

Mortillet's scheme was later enlarged by French experts, especially the Abbé Breuil, to the extent that a new type was interpolated between the Mousterian and the Solutrean, the "Aurignacian Period," called after the town of Aurignac in the south of France. It is characterised by flat, longish (often oval), small instruments, which are very carefully worked at the edge on one side, and very often run to a sharp point at one end.

Quite recently (1916) the Swiss archaeologist Dr. Otto Hauser, who has, with the aid of a staff of trained assistants

and excellent apparatus, systematically explored the Palcolithic stations in the Vézère valley since 1905, and is to-day the highest authority on Palcolithic culture, has introduced a new stage—the “Micoquian,” named

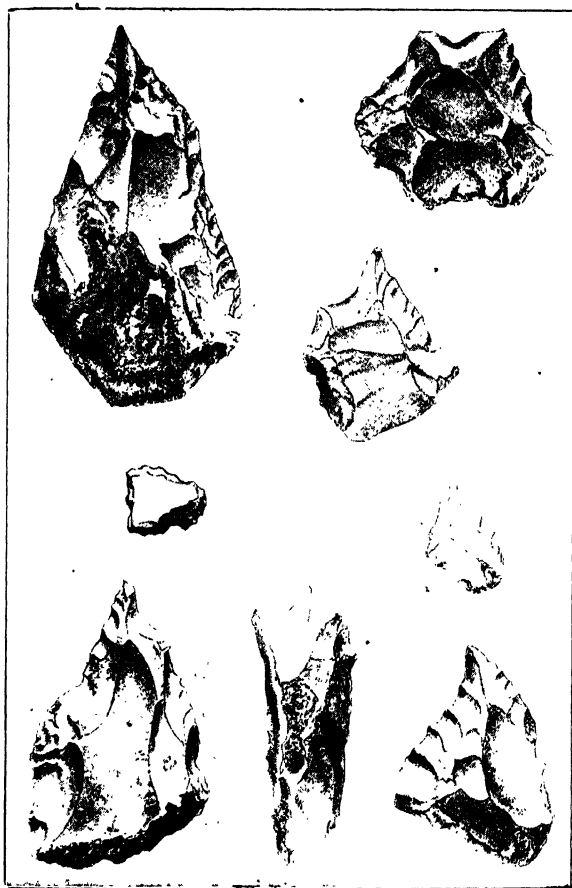


FIG. 79.—MICOQUIAN IMPLEMENTS. (HAUSER.)

after his finds at La Micoque—between the Mousterian and the Aurignacian. In his comprehensive work *La Micoque, die Kultur einer neuen Diluvialrasse* (1916), Hauser shows that we have here a special culture of a remarkably mixed character. [It resembles the Acheulean

and Mousterian on the one hand, and the Aurignacian on the other, but it has also various types of implements which cannot be reduced to these.) "It is," Hauser says, "neither a transition-stage from the Acheulean to the Mousterian, nor to the Aurignacian, but, an entirely independent settlement, which, to judge by the thickness of the stratum (seven feet), must have lasted thousands of years." In the course of an investigation in 1916

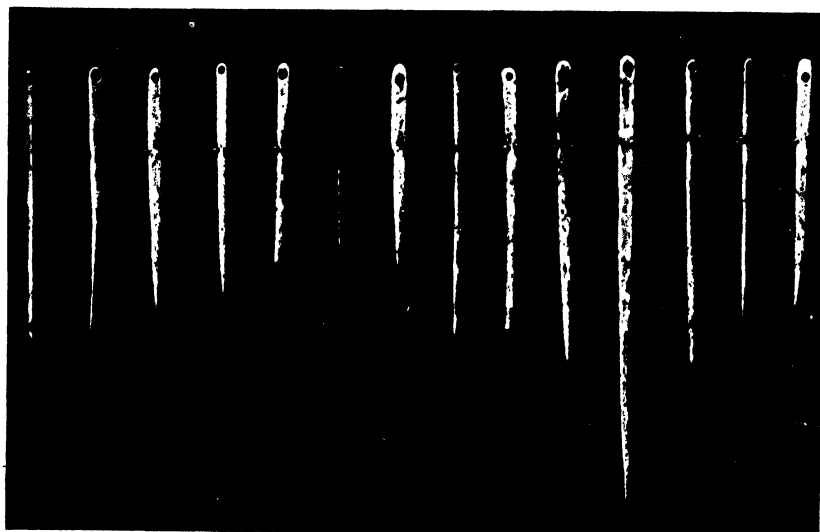


FIG. 80.—BONE NEEDLES OF THE MAGDALENIAN PERIOD.

Hauser traced the Micoquian culture at various places in Germany and Switzerland.

When we survey these various types of culture, we see very clearly that there has been a successive improvement in the making of the implements. On the whole, moreover, this improvement can be compared with a succession of periods which we can gather from a quite different source—the study of the deposits made by glaciers and rivers and the animal remains contained in them.

Even within a particular set of deposits we can often

plainly detect differences which show an advance in the making of implements from one age to another. Here we must take into account, not only the stone implements,

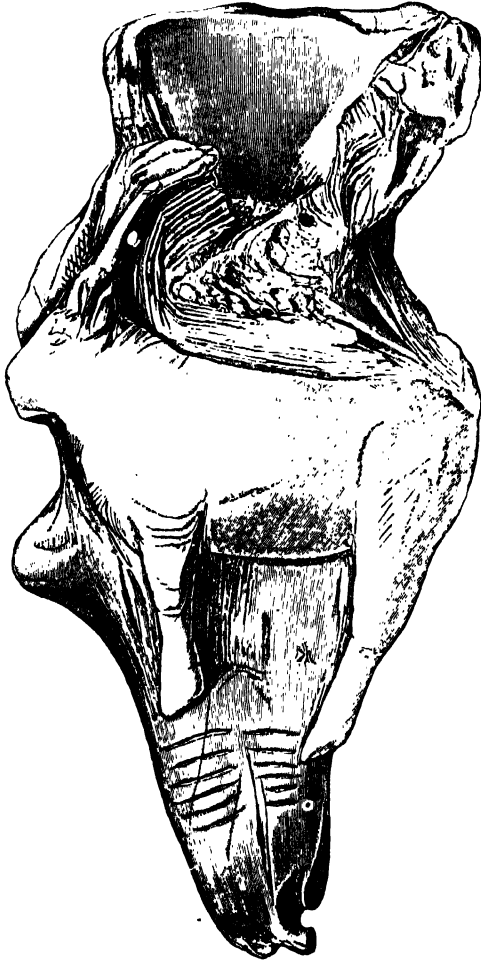


FIG. 81.—PREHISTORIC CARVING OF AN ANTELOPE,
FROM MAS D'AZIL. (PIETTE.)

but also those made of bone, ivory, and horn, which are found in great abundance in the later deposits. It is these which enable us to understand what seems to be an occasional deterioration of the stone implements.

At the same time there is a growing feeling for and skill in art which shows that the men of the Aurignacian, Solutrean and Magdalenian cultures, had reached a relatively high level, although they had no agriculture, domestic cattle, or pottery. The men of these periods, with their artistic sense, contrast very markedly with those who made the instruments of the earlier Mousterian Period. These instruments, for the most part, are little above the level with which we are familiar as the lowest stage of stone-working: either in the case of the lower races of modern times (Australians, Tasmanians, etc.) or in the earlier deposits in Europe, some of which, at least, belong to a time before the Ice Age. These are the implements we have already called the "Eoliths."

It is the special distinction of the eminent Belgian archæologist Rutot to have shown that there are great numbers of more primitive implements than the Chellean; and that there are still earlier deposits—now sometimes called the Pre-Chellean—which contain a gradually improving series of implements leading up to the Chellean hand-axe. These flints are only sharpened at one edge, and the working of them only gradually extends to the whole surface. In many the chipping is so slight that to this day many authorities will not admit that they are human "artefacts," and maintain that the same forms are produced by accident in nature. Rutot has determined a whole succession of Eolithic stages in Belgium. Hauser has recently discovered them in the south-west of France. Harrison and others have collected large numbers of them in Kent and at other localities in the southern and eastern counties of England. Sir E. Ray Lankester and others have contended that a further (though more advanced) type of flint implement, the "rostro-carinate," comes between the Eolithic and the Chellean.

Generally speaking, it is a question of very simple, uniform, crude types of scrapers, borers, scratchers, etc., such as clearly serve the purposes of the lowest savage

hunters. Wherever there was no reason or impulse to change, these crude implements persisted all through the Tertiary Era, and even during the Ice Age, by the side of more finished implements. In the controversy over them it is often said that the constancy of the types is a proof that they are accidental productions, not the work of man. The argument is unsound, as these Eoliths have persisted until our own day amongst lower races such as the Australians and Tasmanians.

The Eoliths are now generally admitted, and they correspond entirely to the universally accepted view of man's gradual evolution. The earliest Chellean implements *must* have had a long series of far cruder predecessors; and the worked stones of the Tasmanians in particular, are survivals of these. Possibly for ages man used only sticks and unworked stones. Then came the Eolithic stage—a very prolonged stage—as the remains show. Next come, according to most of the English authorities, the “rostro-carinate” implements, showing a distinct advance in development. The later successive stages of the Old Stone Age are as we have indicated: the Chellean, Acheulean, Mousterian, Micoquian, Aurignacian, Solutrean, and Magdalenian. We turn now to the men who lived through these advancing periods and wintered through the great Ice Age in Europe.

CHAPTER XII

THE REMAINS OF EARLY MAN

WHEN we study the stone implements of the Ice Age in Europe we are compelled to suppose that at least two different types of men are responsible for the manufacture of them. There seems to have been one human type of a progressive character, which made great progress during the Ice Age and attained a remarkable artistic skill; and another, more backward type, that lingered at the stage of primitive culture that had preceded the Ice Age. The bones we have found in the last few decades have made these two types known to us. The backward type was the Neanderthal race: the progressive type was the Aurignac race. Of the various stages of culture distinguished by Mortillet we can safely ascribe the Mousterian to Neanderthal man, and at least the three following phases to the Aurignac race.

There seems to have been a third human type in connection with the Magdalenian culture; and, taking the name from the places in which bones of this race were first found—the rock-shelter at Cro Magnon, in the Vézère valley—we may call it the Cro Magnon race.

We have already warned the reader that the expression “Ice Age” must not be understood to mean a period of uniform temperature with no change of seasons. Perhaps the phrase generally used in scientific work, “Glacial Period,” is better, as the chief characteristic of the time is the colossal extension of the ice-cap round the North Pole until it reached central Europe. But all

the high mountains of the earth at this time had, according to their elevation, a mantle of glaciers, flowing down over the plains. The Alps, and the Scandinavian, Scottish, and Welsh mountains, all poured sluggish streams of ice over the surrounding country.

As to the causes of the Ice Age we must be content to say that they are not sufficiently known. The most plausible of the many theories advanced is that of the distinguished Swedish chemist Svante Arrhenius: that the Ice Age was due to chemical changes in the earth's atmosphere in connection with great volcanic outbursts. The vast volume of carbon dioxide poured into the atmosphere by the volcanoes of the Tertiary Era seems to be responsible for the mild climate which preceded the Ice Age even in the north of Europe. There was during the early Tertiary in Spitzbergen and Greenland a sub-tropical flora that is inconsistent with a Polar night such as we have to-day.¹

Confining ourselves to facts which are well known, we may say that Europe before the Ice Age was connected with Africa by land-bridges and was, even in its animal population, not very different from the southern continent. Large pachyderms—elephants related to the African elephant of to-day, the southern elephant and the ancient elephant, and the Etruscan and the Merckian rhinoceros—were the chief representatives of the animal world in our latitude, when the advance of the glaciers from the heights of Scandinavia and the mountain chains of Europe caused a mighty disturbance of the animal and plant worlds. Great numbers of ungulates (deer, antelopes, and horses) and carnivores (hycenas, lions, tigers, and bears) made up the picturesque animal world that now had to give way before the cold which brought about the extension of the glaciers. These animals

¹ The Ice Ages—there have been four—are now generally attributed to the rise of mountain chains, and volcanic phenomena are regarded as a secondary influence on climate. [J. M.]

had for ages been hunted by a savage type of man, who had found in the congenial conditions of his life no stimulus to advancement.

This primitive human being was, like the animals themselves, an African. He belonged to the Neanderthal race, the skeletal features of which we now know well enough, from the numerous remains we have found, to establish its relationship to other races and to the anthropoid apes.

The finding of the first skeleton at Neanderthal in 1856 has been described in the Introduction. It at once caused considerable excitement on account of the gorilla-like fore part of the skull. The quarrymen who found the skeleton in a fault of the Devonian limestone, had thrown the bones away, not believing for a moment that such robust thigh-bones could be human. We can quite understand how they took them for remains of a bear; such as were often found in that deposit. Luckily, a teacher, Dr. Fuhlrott, saved the bones. The skull, with its great gorilla-like ridges over the eyes, was particularly interesting. Of the lower jaw, unfortunately, there were no traces; but there were the two thigh-bones and some parts of the arms (Fig. 1).

In England and France the bones were speedily recognised as those of a low human type, but, as was explained in the Introduction, they were generally rejected in Germany, largely through the authority of Professor Virchow. Even the scientific man to whom they were first entrusted for examination, Dr. Schaaffhausen, was not sure of their great antiquity, but concluded that, on the whole, they represented a race living in Germany when the Teutonic tribes arrived! He and Fuhlrott presented their views at the Scientific Congress held at Bonn in 1857, but there was not one scientific man present who would accept them. Huxley and King, on the other hand, fully recognised the human character and great age, and gave the bones the name of the

“Neanderthal man.” The German Professor Mayer scornfully retorted, against Huxley, that they were the bones of a “Mongolian Cossack of Chernicheff’s army-corps of the year 1814.” Professor Wagner claimed that they were the bones of an “ancient Dutchman.” Others thought that they were the bones of “an old man of the Merovingian period,” an “idiot,” a savage who had wandered into Europe, a “Celt,” and so on. Virchow, as has been said, declared the bones “pathological,” and for decades they were little regarded.

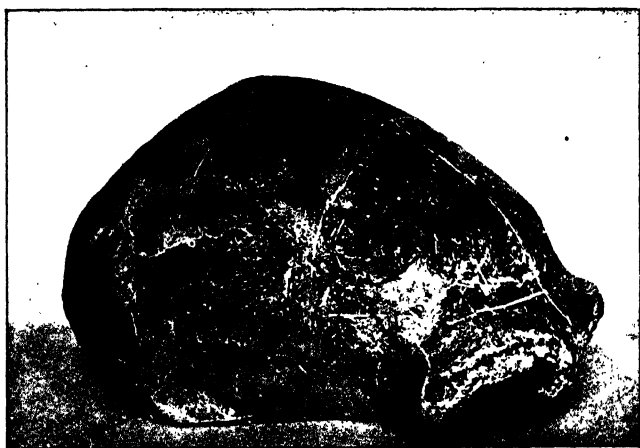


FIG. 82.— SKULL OF THE SPY MAN.

The second find was made in 1886 by the Belgian geologists Fraipont and Lohest, in the cavern of Spy d'Orneau, not far from Namur. No geological details were available about the Neanderthal bones, but the Spy discovery was registered with scientific correctness. Digging into a thick deposit in the cave, the investigators came at a depth of a few yards upon bones of the mammoth, the woolly rhinoceros, etc., and crude human artefacts. Together with these, in an undisturbed layer, were the remains of two skeletons, the skulls and jaws, though much broken, being in a good state of

preservation. The skulls had the same great ridges over the eyes, and the limb-bones the same extraordinary robustness, as those of the Neanderthal man.

The paleontologist Fraipont, who undertook the examination of the remains, reported in 1889 that the new discovery was "an unassailable proof of the soundness of the theory of a Neanderthal race." Later the distinguished anatomist Gustav Schwalbe studied the skull in comparison with that of the Neanderthal skeleton, and I did the same for the limbs; and at last, in the year 1900, the Neanderthal race was fully recognised in Germany.

It happened that a third discovery of Neanderthal remains was made in the same year. This time it was in Croatia. Rarely was a scientific discovery made more opportunely; indeed, I doubt if the Neanderthal race would have been recognised so promptly and generally if it had not been for this find of fragments of a skull at Krapina. The Agram professor of paleontology, Gorjanovic Kramberger, was investigating a cavern in the valley of the Krapinica near Krapina, and had come across remains of glacial animals, especially the *Rhinoceros Merckii*, as well as fire-places and crude human artefacts. He also discovered some human teeth, and then bones, chiefly fragments of skulls, which showed traces of fire. There was no doubt that the human bones had been split open while they were fresh and—probably at cannibal feasts—had come into contact with fire. Although there was not a single whole skull, and the other bones also were in fragments, the material collected, and at once published by the discoverer, was sufficient to enable us to recognise the Neanderthal type once more. A few of the bones did not fit the theory, but a solution of this puzzle was to be discovered later.

The next find we have to notice was that of a lower jaw, of which we have spoken in the third chapter, at Mauer, not far from Heidelberg. It was recovered from

a deposit which was believed to belong to the early part of the Ice Age ; though other authorities put the deposit in the first (Soergel, Penck) or the second (Werth, 1909) interglacial period.¹ This jaw, luckily rescued for science by the Heidelberg anatomist Schoetensack (1907), was the oldest human relic we had yet discovered. It has so many primitive characters that it comes nearer to the

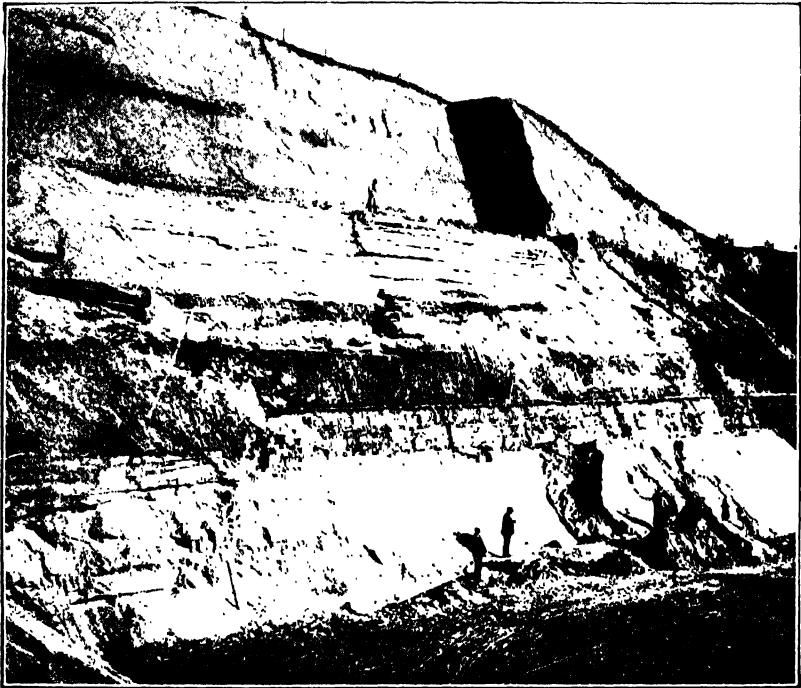


FIG. 83.—WHERE THE MAUER JAW WAS FOUND (X).

theoretical primitive human being than any preceding relic. Particularly striking are the great massiveness of the whole jaw, the entire absence of chin, and the regularity of

¹ With few exceptions, geologists are agreed that at least the last Ice Age was not a continuous period of glacial conditions, but a succession of four or five very cold periods with milder (or interglacial) intervals. Estimates of the duration of the entire period run as high as a million years, but are very uncertain. Recent research in Scandinavia brings the very last phase of the Ice Age down to 10,000 years ago. [J. M.]

the teeth. Its very crude and primitive-looking features, rather reminding us of the gibbon, suggest a lower stage than the Neanderthal. Schoetensack regarded it as a relic of a stage common to the ancestors of man and the anthropoid apes. It is now generally recognised as part of a primitive variety of the Neanderthal race.

The next finds were in France, which, curiously enough, had not up to this time yielded any human remains of great geological antiquity. However, on March 7, 1908, Dr. Hauser, who was investigating the Vézère valley, found

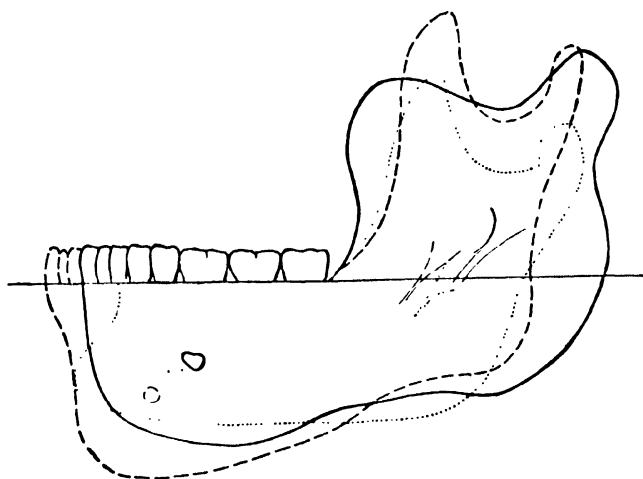


FIG. 84.—OUTLINE OF THE MAUER JAW, A NEGRO (---), AND A EUROPEAN (.....). (SCHOETENSACK.)

fragments of human limbs in the lowest grotto of the four rocky terraces of Le Moustier—about thirty-five feet below the cave worked by Lartet and Christy—in an undisturbed Acheulean stratum. Hauser suspended his work, and in April he made an exact report of the find in the presence of experts and officials. In August Hauser entrusted me with the excavation of the bones; an extremely difficult task, as they were so much broken up. Moreover, the skull had been crushed out of shape by the weight of deposit above it, and this made it almost

impossible to put the fragments together in their original position. The smallness of the limbs and early condition of the teeth showed that they were the remains of a youthful individual fourteen to sixteen years old, and probably of the male sex. After the place where it was found, and in honour of the discoverer, this Acheulean Neanderthal man, with all the typical characters



FIG. 85.—SKULL FOUND AT LE MOUSTIER, PUT TOGETHER BY KRAUSE.

of the race, was named the “*Homo Mousteriensis* Hauseri.”

[A new cultural fact of some importance was that the youth had clearly been buried, in primitive fashion. The head rested on the left arm and on chipped flints which had obviously been put there deliberately. The body had lain as if asleep. A few stone implements round about—a very finely worked hand-axe and a scraper of the Acheulean type—had also been buried with the body; but there was no trace of ornamentation or anything of that kind.]

Stimulated by this discovery, three French priests announced a find that they had made a little later in the valley of the Sourdoire, a tributary of the Vézère (Département Carrèze). In a cave at La Chapelle-aux-Saints they found a skeleton buried in the same primitive fashion as the Acheulean man of Le Moustier. The head, supported on stones, was turned toward the west, and lay on the right hand, as if in the attitude of sleep. The legs were drawn up against the body. The deposit proved to be Mousterian. The skeleton is fairly complete, and the skull, at least the face-part, comparatively very good



FIG. 86.—RECONSTRUCTION OF THE LE MOUSTIER SKULL
BY KLAATSCH.

(Fig. 87). The remains were fully described by the Parisian archæologist Marcellin Boule. It is a typical, and elderly, Neanderthal man, with “quite bestial” ridges over the eyes. The skull and its capacity are larger than in the previous finds. Few teeth are left in the jaws, and Boule thinks this was due to disease, so that the man may not have been more than 50 to 55 years old. The nose,

which Boule describes as "ultra-human," was large, powerfully built, long, and broad.

Another Neanderthal skeleton was found in 1909, at La Ferrassie in the Vézère valley, on the road from Le Bugue to Miremont, where a teacher, Peyrony, had been exploring since 1902. The section which Peyrony worked, in association with the Parisian archæologist Capitan, at once yielded a great number of artefacts in stone and bone, of the Solutrean, Aurignacian, Mousterian, and Acheulean periods. In the Mousterian stratum, which lay immediately upon the Acheulean, was found a



FIG. 87.—THE CHAPELLE-AUX-SAINTS SKULL. (BOULE.)

skeleton, lying on its back, the trunk turned a little to the left, and the legs sharply bent at the knees. The left arm lay along the body, so that the left hand was near the thighs; but the right arm was bent, and the right hand touching the head, on the left, just above the shoulders. The mouth was wide open. All the bones of the skeleton were found, though some were damaged. The body was dug out with the surrounding material, and sent to Boule at Paris. A second skeleton, lying in the same position, was found not far from the first a year later, but only the lower extremities were well

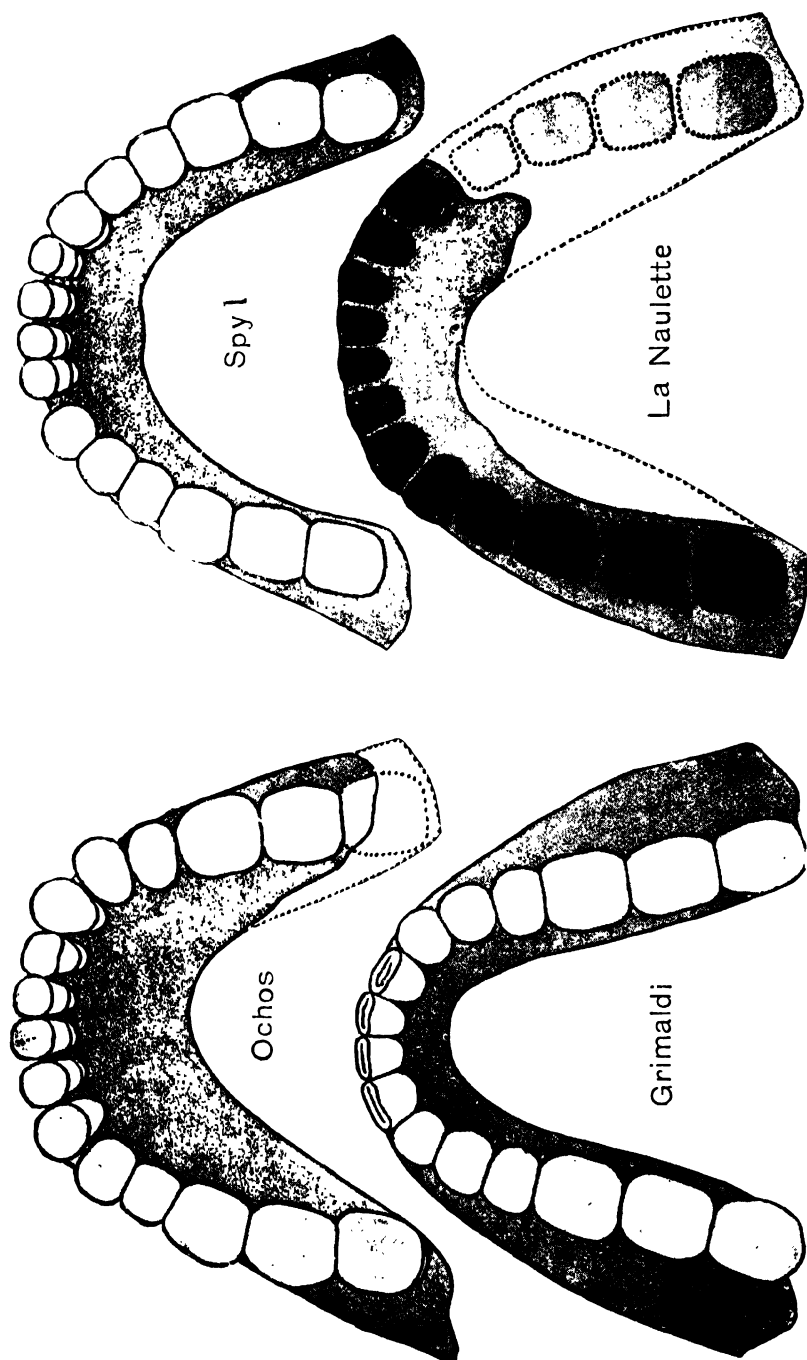


FIG. 88.—PREHISTORIC JAWS COMPARED. (RZEHA)

preserved. It seems to be the body of a little old woman (about 4 feet 9 inches in height). The skull of the first skeleton, though much broken up, has all the usual Neanderthal characters.

In November 1911 a new Neanderthal discovery was made in the Department of Charente, in a Mousterian deposit. At La Quina, in the same Department, other bones of a Neanderthal character (prominent frontal ridges, etc.), were found in 1910 and 1911. The second find was, apparently, the skeleton of a woman, in the lowest part of Mousterian strata. Dr. Martin, the discoverer, thought that the body had fallen into a stream, but the analogy of the preceding finds suggests that the woman had been buried.

To these we must add a find that goes back to a much earlier date, but was only recognised in recent years to be of a Neanderthal character. This was a completely fossilised skull found near Gibraltar in 1848 during work on the forts. Busk exhibited the skull at the Anthropological Congress at Norwich in 1868, and then presented it to the Royal College of Surgeons. The skull is now recognised to be a valuable relic of the Neanderthal race, most probably from a Mousterian deposit. It is unique in that the base of the skull is preserved ; and the fossilised condition itself implies a great age. The forehead is thoroughly Neanderthalian and the face-parts are intact. Although Huxley and others had examined it, a fuller knowledge of the Neanderthal race was needed before it could be identified. Professor Sollas established its primitive character in 1908. It is the earliest find of a Paleolithic skull.

Up to 1915 this was the only discovery in Spain, but in that year the archaeologists Hernandez-Pacheco and Obermaier made a fresh announcement. A jaw, fossilised like the Gibraltar skull, had been found in 1887 at Bañolas, and the death of the possessor had left it free for critical examination. According to a report on it

in the *American Anthropologist*, the features of the "Bañolas jaw" resemble those of La Chapelle-aux-Saints and La Ferrassie (?). "The chin is at least rudimentary, if it can be said to have a chin at all." It is not thought to be as old as the Gibraltar skull.

Other Neanderthal finds must be briefly mentioned. In 1866 Dupont found a fragment of a lower jaw, together with mammoth, rhinoceros, and reindeer bones, in a



FIG. 89.—THE EHRLINGSDORF JAW

cave on the banks of the Lesse at La Naulette (not far from Furfooz) in Belgium. In 1882 Maska found a fragment of a massive lower jaw in the Shipka cavern at Stramberk (Moravia) in an indisputably glacial deposit, yet, according to the careful investigation made (1902) by O. Walkhoff, it belonged to a mere child of the Neanderthal race, at the age when the milk teeth were disappearing. Both these jaws, we may remark in passing, were declared by Professor Virchow to be

“pathological.” In 1905 Rzehak found in a grotto at Oehos (Hadecker valley, the Devonian limestone district of Brünn), amongst remains of mammoth, woolly rhinoceros, wild horse, etc., a fragment of a lower jaw that resembles the Krapina jaw.

Schwalbe also claims as Neanderthal a lower jaw found in 1914 at Ehringsdorf, south of Weimar. Stone implements, animal remains, and some useless fragments of human bone had already been found in this district, when the jaw rewarded the explorers. It was found at a depth of forty feet below the present surface, and, to judge by the implements and animal remains, it dates from the Mousterian. There is no chin; and the jaw arches forward in a way that means greater prognathism (bulging jaws, as in the ape) than in the La Chapelle, Krapina, or Mauer jaw. The teeth also are more primitive and the jaw is the narrowest yet discovered. Schwalbe concluded that it was the lowest known human jaw, “nearer to the anthropoid apes than any other known Neanderthal jaws.” He did not, however, think it a new race, as Dr. Heilborn does. Hans Virchow, who continued the study of the jaw after Schwalbe’s death, came to exactly the same conclusion (*Zeitschr. für Ethnologie*, Bd. 46, 1914).

At Taubach, not far from Ehringsdorf, two teeth of a very ape-like character were found. Even the inexpert is impressed by the resemblance of the Ehringsdorf jaw to that of a chimpanzee, when they are compared, and a careful study of its features fully confirms this. The teeth differ in many respects from other Neanderthal teeth, and approach those of the chimpanzee. It might be suggested that these are individual peculiarities, but in 1916 a second human jaw was found, about thirty yards from the preceding, with just the same peculiarities: the jaw of a ten-year old child, with the permanent teeth under the milk teeth. Hans Virchow thinks the two individuals may have been related (grand-parent and

grand-child) and that we may have here only a "local variety" of the Neanderthal race.¹

Meantime a lively controversy had arisen in England over a skull and lower jaw found at Piltdown, in Sussex, about eight miles from Lewes. Mr. Charles Dawson in 1911 and 1912 found these, broken into fragments, in a gravel pit on Piltdown Common; and part of a second skull, of the same type, was discovered later. In the deposit from which they came were Eoliths; but a large piece of bone, plainly worked by human hand, was also found (in 1914) and seemed to point to a higher level. In the reconstruction of the head, moreover, there were further apparent inconsistencies. The lower jaw is so brutal in type that some of the American and German authorities regard it as belonging to a chimpanzee. This opinion is generally rejected—the chances against such a coincidence are overwhelming—but the jaw is one of the most primitive known, yet the skull was claimed as belonging to a race differing from, and much higher than, the Neanderthal race.

The controversy which has raged over these broken relics of early man since 1912 is easily understood. As large sections of the cranium were missing, it was possible to put the surviving pieces together so as to make the capacity of the skull larger, and the forehead higher, or the reverse. Dr. A. Smith Woodward, supported by Sir A. Keith and others, represented the former tendency, and gave the forehead a considerable elevation. Quite recently, however (June, 1922), Professor Elliot Smith and Professor Hunter, two of our highest authorities, have made public a new and most painstaking reconstruction of the famous skull, and the slope of the forehead

¹ Heilborn would give the Taubach and Ehringsdorfer man a special position outside the Neanderthal race. He and Dr. Hauser have concluded from the implements and geological features that the remains are "Micoquian," not Mousterian; and he holds that the approach to the chimpanzee and divergence from the Neanderthal type in a whole group of characters puts these remains outside the later race.

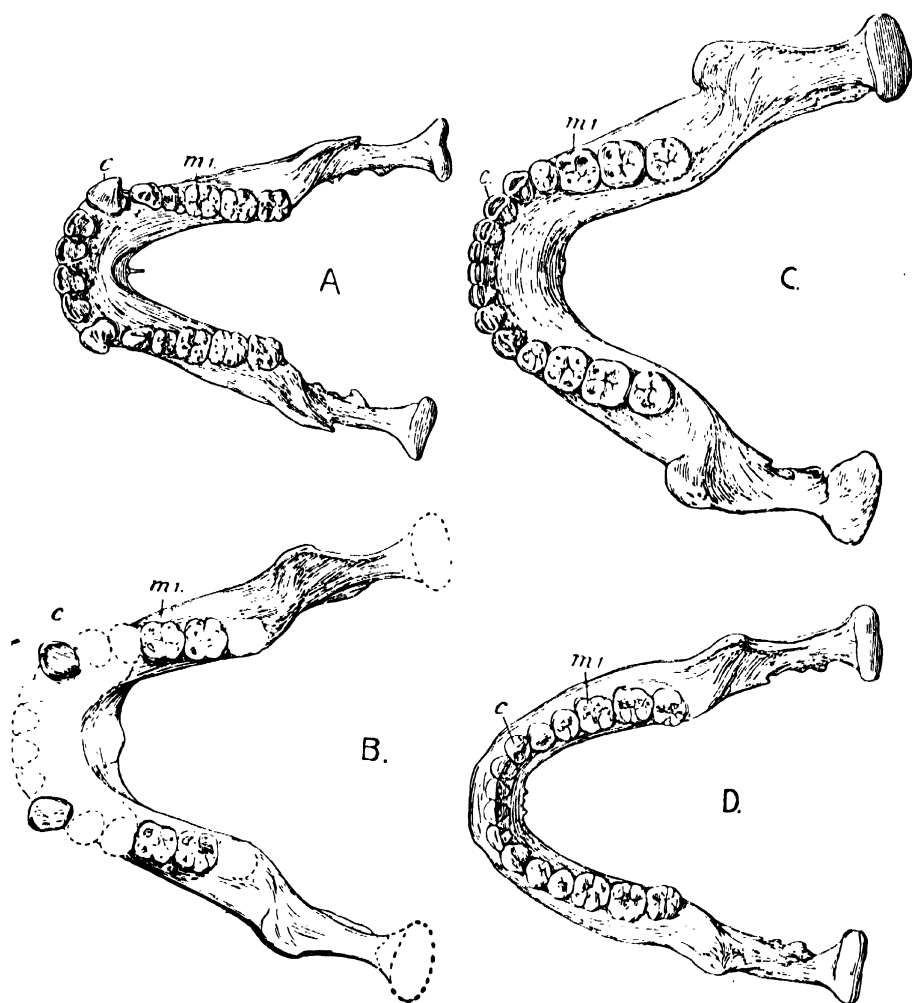


FIG. 90A.—THE PILTDOWN JAW (B), COMPARED WITH CHIMPANZEE JAW (A).

FIG. 90B.—THE PILTDOWN JAW COMPARED WITH HEIDELBERG (C), AND MODERN MAN (D). (SMITH WOODWARD.)

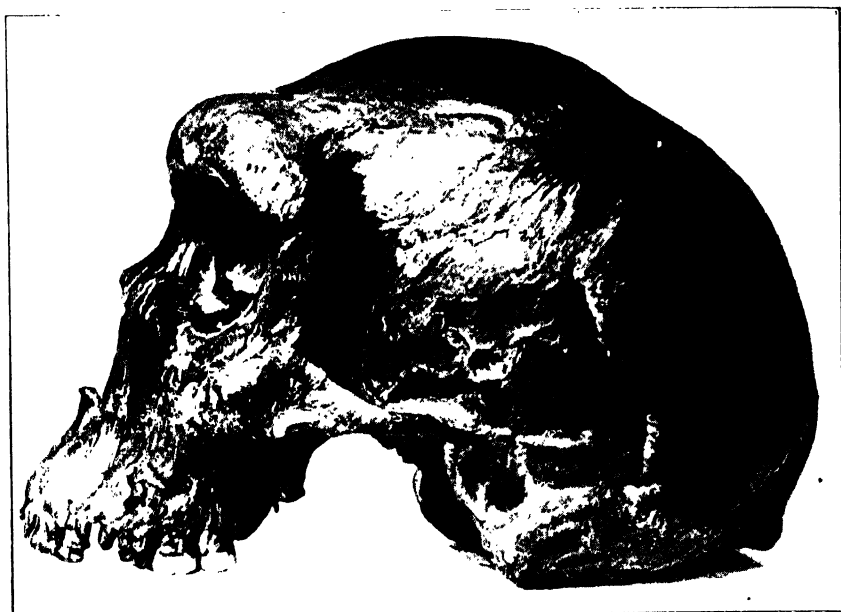


FIG. 91.--THE BROKEN HILL SKULL. (HAUSER.)

is quite in harmony with the chimpanzee-like jaw. Professor Elliot Smith thinks the brain of "Eoanthropus Dawsoni," as the being is called, "the most primitive and the most simian human brain so far recorded." Sir A. Keith, (*The Antiquity of Man*, p. 501) estimates its age at about 400,000 years.

The finding of this very early skull and of such an abundance of Eoliths in England already disposes some to speculate whether this part of the world—England was in those remote days part of the continent of Europe—may not have been the cradle of the race. A still more primitive skull-cap, however, was discovered in Java in 1894, as we have stated in a previous chapter. Dr. Smith Woodward suggests that these Java remains may be those of a very large gibbon, but the cranial capacity is 300 cubic centimetres greater than that of any ape ever known. The remains are therefore almost universally recognised as the most primitive human remains yet found, and the being is known as the "Pithecanthropus" (or Ape-Man) of Java. It is not regarded as an ancestral type to any known race.

In 1922 a very primitive-looking skull was found in Rhodesia, and the final report on this is not yet to hand. There seems, however, at present reason to regard this as not geologically ancient, though very primitive in some (by no means all) of its features, and it does not therefore properly enter this story. Primitive types, as the extinct Tasmanians show us, may linger unchanged for hundreds of thousands of years. So far, therefore, the various finds of human remains of the early Old Stone Age are, apart from the Java man, confined to Europe. The various finds announced in America and Australia are not generally regarded as geologically ancient. But in Europe the remains are so numerous that the Neanderthal race, the men of the early Old Stone Age, are now fairly well known; and we may have glimpses of earlier and independent varieties of men in the Mauer jaw and the Piltdown remains.

CHAPTER XIII

THE MEN OF THE GREAT ICE AGE

FROM the score of skulls and skeletons, so uniform in their general features yet so scattered in space and time, which we have now surveyed, and from the stone implements which they have left in enormous numbers, we can form some idea of this remarkable Neanderthal race of men.

They were thick-set men of moderate height, probably on the average not so tall as most of the European races of to-day. The medium height seems to have been about five feet two inches. The extraordinarily sturdy appearance of the limb-bones reminds us of the skeleton of the gorilla. Careful comparative study of the details, moreover, has shown that there is much more than a superficial resemblance. After a minute examination of the bones of the arm (humerus, ulna, and radius) and the leg (femur, tibia, and fibula) I have found that in the nature of the joints and the attachment of the muscles there is a very striking approximation of the Neanderthal race to the gorilla: an approximation that in many respects is greater than that of the gorilla to the chimpanzee.

The proportions of the limbs in the Neanderthal race are typically human; that is to say, the arms are shorter than the legs. Although the bones of the gorilla have experienced the modifications which are peculiar to the man-like apes—a considerable lengthening of the arm-bones and a shortening of the leg-bones—they have nevertheless, retained certain features of a pre-gorilla

and pre-Neanderthal primitive form. We cannot enter here into a detailed discussion of these bones, but must be content to point out certain resemblances that even

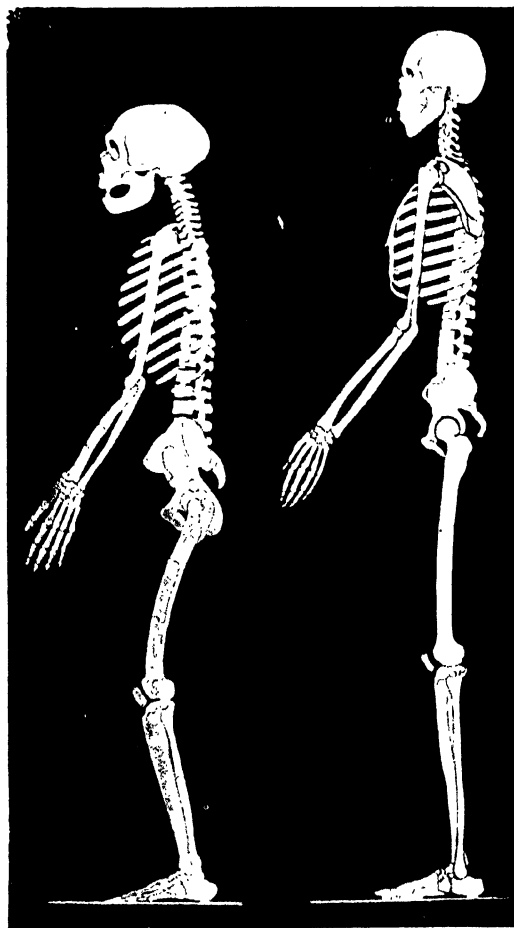


FIG. 92.—SKELETON OF AN AUSTRALIAN (right)
AND THE NEANDERTHAL MAN OF CHAPELLE-AUX-
SAINTS. (BOULE)

the inexpert cannot fail to see, such as that of the short and strong thigh-bone of Spy man to the thigh-bone of the gorilla and the pronounced curve of the radius in both cases.

As to the skull, the resemblance of the Neanderthal race to the gorilla was startling from the first. Here again there are many resemblances in the bones of the face and of the base of the skull and the lower jaw; and these are the more remarkable as there was not in the case of the Neanderthal race or its ancestors that growth of the canine teeth which had so much influence on the form of the gorilla. The head of these primitive men was not small. The cranial capacity is low (about 1,300 cubic centimetres), but the skull was long and broad. In the case of the gorilla the ridges over the

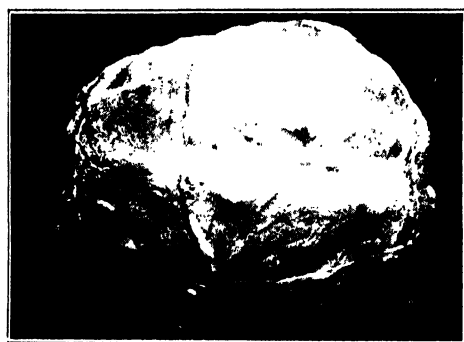


FIG. 93. —CAST OF INTERIOR OF NEANDERTHAL SKULL.

eyes increase with the growth in size of the muscles of the jaws and temples. It was the same with Neanderthal man; the skull of the youth of Le Moustier has smaller frontal ridges than that of the old man of La Chapelle-aux-Saints, in which the bald part of the forehead, with the continuous frontal ridges, looks rather like the raised visor of a knight's helmet. In the case of the gorilla, however, this process goes to the extreme length of a complete overlaying of the skull with muscles on account of the enormous growth of the canine teeth. The brain, which was at first respectable, remains stationary. There is no such deterioration in the Neanderthal men. The

cast of the cranium of the Neanderthal man in the museum at Bonn enables us to compare it with the brain of a gorilla. There is a clear resemblance in the relatively poor development of the front part of the cerebrum in the two cases.

Extending this comparative study to the negro, we find that amongst the latter there are some groups which may be regarded as offshoots from the common stem of the Neanderthal race and the gorilla. This is seen both in the skeleton and the form of the cerebrum. We refer to the large and muscular African peoples who have the typical thick lips and prominent jaws of the negro. This is, of course, only one element of the very diversified population of Africa to-day. In many other cases our knowledge is not complete enough to be able to determine their affinities. Nevertheless, it is something to bring the genuine African negroids into relation with the earliest population of Europe, and it helps us to understand man's evolution.

That the representatives of the Neanderthal race were real men need not be stated. The old idea that the earlier types of men went back toward the monkey is not consistent with the facts. They point rather to a common ancestor of man and the man-like apes. But we must be careful not to read this as a suggestion that the Neanderthal men came from gorillas. The larger amount of modification of the original type is on the side of the gorilla. Beyond question its ancestors were much more like man. They must have been almost able to stand upright. The Neanderthal men could certainly stand erect, though their leg-bones still have traces of the earlier animal stage.

Of their external appearance we, of course, can say nothing positive. It is tempting to draw analogies with the gorillas and negroes on account of the general resemblance; and, indeed, one is almost justified in doing so. It is clear, however, that this would give us only suggestions which we could never prove.

On the other hand, it is easier to gather something about the mental life of these primitive beings. We have their stone culture, and this tells us that they were at a low level. The complete lack of any artistic feeling, especially, gives us an impression of inferiority, of a certain crudeness, which gives even the savage of Australia or Africa to-day an advantage over them.

The brain of Neanderthal man was not small. There was a strong development of the hind part of the cerebrum, and this means a good development of the centres of vision. They must have been great hunters, but they are not likely to have had much further intellectual life. We should not be far astray in ascribing to Neanderthal man a good deal of the bestial aspect which the lower blacks seem to us to have.

The distribution of the Neanderthal race is gathered from the places where their remains are discovered: it is clear that they spread over the whole interior of Europe. And as we have not to consider the bones only, but must regard also the Mousterian and Acheulean implements, the range of their distribution becomes all the greater.

It is not possible to say how long the race lasted. Probably the inhabitants of Europe before the Ice Age were of this type, and it clearly survived all through the Ice Age. Were they ultimately destroyed, or did they mingle with a later race and so have their share in our blood to-day? To find an answer to this question we must turn to the other European race of the Great Ice Age—the Aurignacian race.

It was not until the Neanderthal race was firmly established that the question could arise whether any other fossil type of man was to be found in Europe. There was no lack of material. Already in England and Moravia there had been found skulls of, presumably, great geological antiquity, but the very fact that they were not of the Neanderthal type stood in the way of

their recognition, as it was generally believed that Paleolithic man must differ very appreciably from modern man. Some experts even inclined to the opinion that the Neanderthal men were the only primitive men, the ancestors of at least all Europeans; and this is the source of the quite unsuitable name "*Homo primigenius*" (first-born man) which Schwalbe and others gave to the Neanderthal race. It is as unhappy as the name "*Elephas primigenius*" for the mammoth, which was formerly regarded as the earliest representative of the elephant family in Europe.

A fresh discovery made by Hauser in 1909 brought to the front the problem of the second race of Paleolithic men in Europe. Here again it was the Dordogne Department that contributed the new discovery to science. While digging in the grotto of Combe Capelle, in the valley of the Couze, a tributary of the Dordogne, Hauser's workmen came across a skeleton lying beneath an entirely undisturbed bed of Aurignacian culture.

It was clearly a case of a burial. The rocky floor of the semi-cavern had been partly hollowed out to receive the body. It lay on its right side, doubled up in the way we have described, the feet quite close together, and the knees bent. The suspicion that it was a typical case of binding is based upon the fact that the feet had remained in their position, whereas the thigh-bones had been driven wide apart by the pressure of the overlying earth. Moreover, the bones in the central part of the right foot had been bored through, as if a cord (possibly made from vegetable fibres, as we find in Australia) had been passed through them.

There were fine implements of the Aurignac type lying by the head and breast, but the best ornament was a shell necklace, bored through and strung on a cord. There were twelve shells of the *Nassa reticulata*: which shows that the men of the time brought ornaments from a considerable distance. Possibly we may further

conclude that already reverence was paid to the dead, at all events, the feeling for beauty that was evinced was in striking contrast to what we find in the case of the Neanderthal race.

This cultural contrast was supported by anatomical study of the remains. It showed differences in the skeleton which we usually find only between animals of different species. Although the height was not materially different from that of Mousterian man, in skeletal structure this "Aurignacian man" (*Homo Aurignacensis* Hausseri, as I named him from his cultural affinities) was very different. The bones of the limbs were remarkably slender, and had a pronounced muscular contour. The joints were small. The radius was flattened in front: the femur at the side.

In the skull the differences are even more apparent. The forehead is high, and finely domed: the top of the skull is very long (about 200 c.m., like the Neanderthal type), but remarkably narrow and high. The occipital (back) part of the head is prominent and there is a special prominence of the left half. The face, which is very long in the Neanderthal type, and makes a peculiar impression on account of the large round eye-orbits and large nasal opening, is in the Aurignac type more like what is now generally regarded in Europe as a good face. In profile it is straight or "orthognathic" (without bulging teeth or jaws), as opposed to the prognathism of the Neanderthal face, which reminds one of an animal's muzzle. The teeth, in spite of the advanced age—it is probably an individual between forty and fifty—are perfectly preserved and free from traces of disease. They are well developed, but they differ from the Neanderthal teeth in the circumstance that the cavity within the teeth (pulp-cavity) is smaller. The lower jaw is not particularly large, and the chin is level—the lower part does not stick out, as it generally does in a modern European, nor does it slope inwards

like that of the Neanderthalian. In this respect the Mauer jaw is quite rounded, as we find the chin in the case of the apes.

My detailed comparison of the two types of skeleton convinced me that here we have two quite different races. The differences are so great that there can be

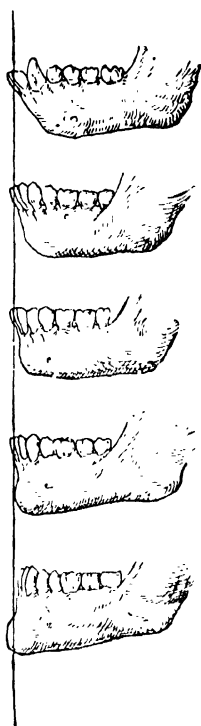


FIG. 94.—EVOLUTION OF THE CHIN
(APE, NEANDERTHAL, AUSTRALIAN,
AFRICAN, AND EUROPEAN).

no question of one race being derived from the other. All that we can admit is a very remote common ancestor. And as a result of the discovery of the typical “Homo Aurignacensis,” the well-preserved skeleton of which is now with that of the Acheulean man of Le Moustier in the Berlin Museum of Anthropology, it was possible to bring into line a number of other discoveries.

In 1888 a skeleton was found in the diluvial sands of the Thames valley at Galley Hill, in Kent. The skull—the remains are in a private collection—is, like the Aurignac skull, remarkable for its narrowness, height, and length. At the most one may recognise a certain lateral depression, but there is no real “dolichocephalism” (long-headedness). The first scientific examination of the remains was made by the London geologist Mr. E. T. Newton (1874). I thoroughly studied the skull in 1903, and believe the remains to be of the Aurignac race.¹



FIG. 95. —THE BRÜNN SKULL. (MAKOWSKY.)

To the same category belong several skulls which were found some decades ago in the diluvial sands near Paris, and were not properly appreciated. Rutot has the merit of resending these skulls, especially the Grenelle skull, which closely resembles that found at Aurignac, from oblivion. The diluvial sands of the valleys of the Seine

¹ Mr. Newton was positive that the Galley Hill remains were found in an undisturbed Chellean deposit, and are therefore amongst the earliest of the Old Stone Age. Sir A. Keith, who believes that there was a higher as well as a lower race as early as the Chellean, endorses this. Professor Klaatsch's opinion, that the remains are much later, is the general opinion. [J. M.]

and the Marne are very rich in fossil remains of the Glacial Period, and human bones are still found amongst them. The French experts have, perhaps, not done enough in the exploration of these important sites in the neighbourhood of their city. We still lack the proper information to relate the human remains to the types of implements which are found there. All that we can do is to conjecture that these remains are, like the Galley Hill skull, geologically older (?) than the remains found at Aurignac.



FIG. 96.—PREHISTORIC DRAWING OF A BEARDED MAN, ON MAMMOTH BONE.

Probably the fragments found by A. Makowsky in Moravia near Brünn in 1891, belong to a later age. The whole of the district is rich in animal remains of the Glacial Period. Large quantities of mammoth bones, in particular, are found. Makowsky found associated with these the fragments of a skeleton which had clearly been buried. The skull has much the same dimensions as the Aurignac skull. Of the artefacts that were found near the skeleton, and had probably been placed near it, the most remarkable was a crude figure of a man

carved out of a piece of mammoth tusk. It is about four and a half inches long, and the pronounced marking of the ridges over the eyes makes it typical of the men of the time. The sex-parts are strongly brought out, as is the case in nearly all these prehistoric drawings and carvings. If we may trust another drawing of the Aurignac period, Aurignacian man had a good beard, and his body was covered with hair.

Finally we have to notice a find at a place—Krapina, in Croatia—to which we have already referred in connection with the Neanderthal race. We then mentioned that remains were found also of a man of a different type, of the Aurignac race. This is, up to the present, the only place where both types of the men of the Great Ice Age have been found together; and the character of the remains suggests that there was a struggle between them for the possession of the cave. The stone cultures of the two races are often found side by side. At the spot where the Aurignac man was discovered in the Dordogne it was found that the floor of the shelter was covered with the rubbish of a Mousterian settlement. The Aurignacians had pushed this to one side when they buried their dead. It seems that the first inhabitants of the grotto were Neanderthal men, and these were replaced—perhaps displaced—by Aurignacians. But before we consider whether their relations were friendly or unfriendly, we must try to form some idea of the character and origin of the Aurignac men.

When the discovery of the Aurignac skeleton was published, there were amongst the experts some who, in spite of the great difference between the two types, protested that possibly the Aurignac race was only a branch of the Neanderthal race. From the anatomical point of view this cannot by any means be accepted. Moreover, we have found no intermediate forms between the two types. The Aurignacian men suddenly appear, as a new type, beside the old. We may, therefore, conclude



FIG. 97.—THE MAMMOTH, FOUND IN THE ICE IN SIBERIA (AND RECONSTRUCTED).

that the Aurignac race *migrated into* Europe during the Ice Age.

This suggestion in regard to man is entirely in harmony with what we know about the animal world of the Ice Age. We have already pointed out that before the Ice Age the character of the fauna was wholly African. It was a world of warm-loving animals, and it retired before the advance of the glaciers. During the Ice Age a new world of animals appears, and in their external characteristics they have all the marks of being accustomed to a *cold* climate. Their chief representative was the mammoth: a species of elephant (*Elephas primigenius*) with a thick coat of hair, so that it could defy the cold. With it was a rhinoceros that was similarly covered with hair. Bodies of some of these creatures have been preserved in the frozen soil of Siberia as effectively as in a cold-storage room, and occasionally they come to light. We have found carcasses of the mammoth just as the artists of the Ice Age represented it on plates of bone or on the walls of their caverns: a gigantic elephant with a thick mane. We have also found the skull of the woolly-haired rhinoceros (*Rhinoceros tichorhinus*), which clearly differs from the pre-glacial African types of rhinoceros (*Rhinoceros Merckii* and *etruscus*) in the teeth and, especially, in the character of the partition between the nostrils. There were also other ungulates besides the mammoth: the giant elk, its antlers stretching ten feet from tip to tip, the reindeer, the musk-ox, the bison, and the antelope. Small rodents, such as the cold-loving ringed lemming (*Myodes torquatus*), complete the picture. This family of animals—a pronounced cold-region fauna—came upon the older, and, according as the glaciers advanced or retired (as they did three times), they displaced the warm-loving animals until the fauna became entirely composed of creatures which live in the cold.

Whence came these cold-loving animals? We have not far to look. The mammoth is related to the Indian

elephant just as the earlier elephant was to the African. Thus the new animals came from Asia, probably after the first extension of the glaciers, in the vicinity of which they would become adapted to the cold. Along the edge of the ice they wandered into Europe in search of better pastures.

With them came the new type of man, the new European, much nearer to us in his organisation than the Neanderthal savage was. Fortunately, we have here not to rely merely on guesses and hypotheses, for we have a very firm basis in the comparative-anatomical study of the skeletons.

The slender skeleton of the Aurignac type closely resembles the forms we find to-day in the races of southern Asia, the Pacific Islands, and Australia. Precisely in those points in which the Aurignac type differs most from Neanderthal man it agrees most with the eastern representatives of the human race and of the anthropoid apes. Once it was realised that in any comparison with the man-like apes we must leave out the disproportionate development of their limbs, it became clear that the differences between the African apes and those of the Asiatic islands have parallels in the differences between the various races of men. The orang, in particular, is the anti-type to the gorilla in this comparison; the chimpanzee occupies an intermediate position, and the gibbon is very primitive.¹

The idea of eastern and western types of humanity

¹ The Ehringsdorf jaw, as I said previously, raises the question of a possible third race. Klaatsch himself, in speaking of the Aurignac race (*Zeitsch. für Ethnologie*, Bd. 12, 1920), pointed out that the primitive stem broke into its main, and known, branches early in the Tertiary, and that there were probably other branches of which we have no trace. He observed that the gibbon is, apart from the long arms, very primitive and nearer to man in some respects than the other apes; and he raised the question whether there might not be a "gibbonoid" branch of the early human family just as there are gorilloid and orangoid branches. The Heidelberg jaw and the Eoliths might, he thought, point to this earliest European population. There might also be a "chimpanzoid" branch; and the Ehringsdorf jaw and the Micoque culture may be quoted in this connection. The zoologist, F. Melehers, held this theory of four related branches of apes and men, and thought the Pithecanthropus of Java the representative of the "gibbonoids." [Heilborn.]

was suggested first by study of the skeletal structure, but it is now found that there are also differences in the contour of the cerebral cortex. We cannot go into details here about the skeletal structure. It must suffice to couple the results of special research with the general and easily verifiable facts which make it clear that there is a remarkable similarity in type between the living races of Europe, the aboriginals of Australia, and the peoples of southern Asia. The resemblance of the Australians was first pointed out by Huxley, who was supported by Richard Semon; and the present writer has proved it in detail after a three years' study of the Australians on the spot. The natives themselves naïvely confirmed the point by welcoming the first Europeans as the ghosts of their dead. A glance at photographs of Australian male aboriginals will do more than a learned discussion to convince the reader of the link that connects us with the savages of the southern continent, and which repeatedly occurs to one when one is amongst them. They are nearer to us than Malays or Mongols are, and they deserve our sympathy, more than Africans do. The term "Australian black" ought to be avoided. We do not name Hindus and Cinghalese by their colour.

By thus connecting the Australians with one of the types of men that lived in Europe during the Ice Age we find a satisfactory solution of the much-discussed problem of the "Indo-Germans." There is no need to imagine any "Aryan" migration to Europe from the south or centre of Asia. Not only has no evidence of this ever been found, but we now have definite evidence that the "Aryan" Hindus migrated from the region of Asia Minor (where they formed a common family with the Persians) to India about four thousand years ago. Many scholars even regard the Polynesians as having come from the borders of Europe, in the Caucasian region. But we will make a more general survey of the problem of the distribution of the race, as far as our limited knowledge permits.

CHAPTER XIV

THE DISTRIBUTION OF THE HUMAN RACE

IN confronting this problem we have the results of comparative studies of the skeleton to guide us to some extent, but we must admit that these are only a few points of light in the general gloom. The common groundwork of all theories of the dispersal of the various branches of the human family is a hypothetical group of Primates to which we may give the name of *Propithecanthropi* ("primitive ape-men"). We have throughout this work seen volumes of evidence which compels us to admit the existence of this common ancestral group for men and the apes. Some recent authorities look to central Asia for the home of this group, but the distribution of the apes and primitive man—over Asia, Africa, and southern Europe—points to some district to the south of Asia. The Australians with their dingo, could reach their continent directly from here by means of land-bridges which have since been destroyed. Studer long ago called attention to the close affinity of the dingo to the wild dog (*Canis rutilans*) which was at one time very common in eastern Java, though it is now dying out.

To Java everybody turns for some trace of the lost continent on which the first stages of man's evolution took place. Until quite a recent date it was connected with Sumatra, the mammals of which are not in keeping with its insular character. They suggest rather an ancient connection with Asia and Africa. Moreover, Java, being the place where the remains of the famous

Pithecanthropus were found, very forcibly suggests that the centre from which the various races of men, if not of anthropoid apes, may have spread, should be sought in the vicinity of the Malay Archipelago. Whatever one may think of the extraordinarily flat skull-cap of the *Pithecanthropus*, so human, nevertheless, in its length and breadth, it is certain that the creature must have belonged to some central branch of the Primates: that is to say, a branch which is related to various, and ultimately very different, forms either of human types or man-like



FIG. 98. SKULL-CAP OF THE JAVA MAN. (DUBOIS.)

apes. The skull-cap of the *Pithecanthropus* closely resembles that of the apes in their early years, except as regards size. But it is also related to human types: both to the fossil remains of primitive humanity in Europe, and to the races of Australia and some of the Pacific Islands. The slenderness of the thigh-bone that was found in Java agrees with that of the Australians and the peoples of the Archipelago.

As to the geological age of the Java bones, the investigation is not yet complete. Dubois, the discoverer, ascribed

them to the later Tertiary, but subsequent investigators have contended that the strata in which the bones were found belong to the early Pleistocene. The anatomical study of the bones is, however, independent of this. Even if the remains belong to the Glacial Period, it is

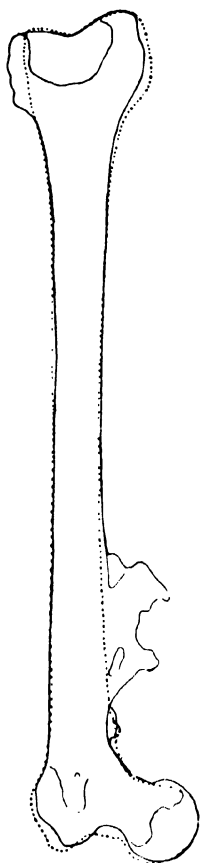


FIG. 99.—THE JAVA FEMUR COMPARED
WITH AURIGNAC MAN.

possible that similar creatures lived there in the Tertiary.

For the present we can only suggest a very broad outline of the dispersion of the human race from its hypothetical "cradle." Probably there were repeated outpours over Africa and Asia, one wave of population

falling upon another. The western stream we have recognised in the primitive negroids of Africa, the gorilloid stem, and the final offshoot, the Neanderthal race. An eastward-flowing stream, after detaching the Australians, gave the Asiatic continent its first population, of which there are traces in various places to-day. Such are, for instance, the Aino, the original population of Japan, who remind us so strongly of the cruder European types and the Australians.

We have not yet sufficient evidence to determine the position of the Malays and Mongoloids. In the present state of our knowledge it is probable, at least, that they

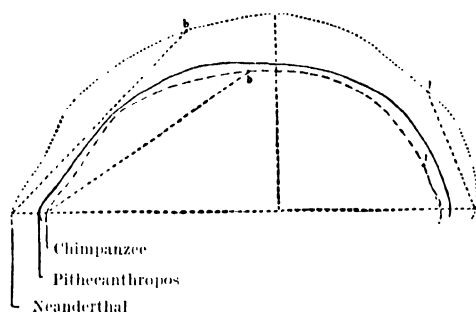


FIG. 100. THE JAVA SKULL COMPARED TO APE AND NEANDERTHAL.

represent a side-branch of the Austral-Caucasians, as Huxley called the common stem of the Europeans, Hindus, and Australians. The Malays and Polynesians probably form a common group which is nearer to the primitive state of the stem. Many of the Polynesians—the famous belles of Samoa, for instance—have quite a European look: a point that is not entirely negligible in judging their affinities.

The Malay skull shows considerable modifications from the primitive type, yet at the same time it has very striking points of contact with that of the orang. A good many travellers have noticed the resemblance in head and face between the man-like apes of Borneo and

Sumatra and the human population of those regions. The orang is clearly the final product of a process of degeneration upon which a branch of the *Propithecantropi* entered as a result of adaptation to forest life.

The Malays have in many respects the specific characters of the Mongoloid stem: the obliquity of the eyes (which is due to the development of the "Mongol fold," a peculiar-



FIG. 101.—AN AINO.

ity of the upper eye-lid which is rarely found in Europe), the prominence of the cheek-bones (which begins in the primitive Australian type), and the proportions of the limbs or shortening of the legs (a more or less parallel development to that of the apes).

The origin of the primitive population of America cannot yet be decided. There are at least two possible

sources : a migration from Asia by a land-bridge across the Behring Straits, and a direct passage from Europe (across land which used to exist in the North Atlantic) before the Ice Age or during one of the interglacial periods. There are many resemblances between the culture of the Eskimo and that of late Paleolithic man in France which point to the latter hypothesis. American anthropologists now favour the idea that their earliest



FIG. 102.—FUEGIANS, MAN AND WOMAN.

population came direct from Europe, and the later "Indian" population from Asia. The question is still full of puzzles, especially as regards the Yahgans of Tierra del Fuego, whose very primitive physical and cultural features remind us of the lowest known races of the Old World; though no points of contact have yet been established.

While, however, we can now follow the modifications

of the skeleton in the various races of men with some confidence, our knowledge of the causes of changes in their external appearance is still rudimentary. It is the more regrettable as it is precisely these external features—colour of skin and type of hair—which we use most in distinguishing races. Such distinctions are found on the Egyptian monuments (wall-paintings, etc.) of more than four thousand years ago, but even the latest attempts of anthropologists to classify races by them are full of difficulties. Indeed, a recent authority, E. Fischer (1914), has declared that all these peculiarities of the various races are the local effects of environment, food, etc., accentuated by sexual selection, and can be found in the same way amongst domestic animals.

Any attempt to solve the various problems from the evolutionary point of view is confronted with the difficulty that we do not know what were the features of prehistoric man in this respect. Even as regards living races we are imperfectly informed about these "racial characters." We know, for instance, little about the various developments or degenerations of man's hairy coat. As a general explanation of the degeneration we have already suggested the influence of the camp-fire, which would disturb the body's mechanism for protection against cold; but the reasons for the inequality of the degeneration in different races we do not know—why, for instance, the Austral-Caucasians have more hair on the body than other races.

It is equally difficult to explain the differences in the development of hair on the head in various peoples. We have, it is true, some reason to think that the wavy hair of the Austral-Caucasian is the primitive type, and that the others diverge from this in all directions, as far as the extreme developments of the straight hair of the Mongoloids and the woolly hair of the negroes; but we do not know the essential factors of these developments.

It is even less to the credit of science, and more surprising to the outsider, that we must admit that we have as yet no satisfactory explanation to offer of the causes of differences in skin-colour. The chief discriminating character within the Austral-Caucasian groups is the colour of the skin in parts where it has little hair on it. In the case of the Australians the colour is a dark brownish red. They are often called "blacks," in opposition to the "whites"; but both descriptions are wrong. There are only a few exceptional human beings and animals, known as "albinos," that have no colouring matter at



FIG. 103. SECTION OF THE SKIN
OF A BRUNETTE.

all in the skin; they are found even in Africa and the Pacific Islands. In these cases the iris also has no colouring matter and looks red, as the colour of the blood then appears in it. This is a diseased condition. Normally there is always colouring matter in the hair and the skin, though the quantity varies considerably. This pigment consists of a fine-grained material that accumulates either inside the cells of the epidermis (outer skin) or in the connective tissue below: generally in the cells and their branching processes.

Hairs are outgrowths of the epidermis, the cells of which are horny. They become gray on account of certain changes in the interior of the "hair-shaft." Air gets into the central cord of cells, the "marrow." It is the variations in the quantity of colouring matter in the cells of the hair that cause the external differences of colour, from light blonde to coal black.

On the skin itself, between the hairs and on the hairless parts (palms, soles, parts of the lips and nostrils, etc.), the colour varies according as the pigment is deposited in the epidermis alone or in the cutis also. In the latter the accumulation occurs at particular spots; it is the distribution of the pigment in the epidermis (especially its lowest stratum) that causes a general darkness of the skin. Even the "white" Europeans have it in some degree. A larger degree gives the light brown skin of the southern, shading gradually toward that of the coloured races. The colour of the blood showing through the skin gives the European his "rosy" tint, and sometimes gives a red tinge to a skin with plenty of pigment in it. Hence the "red skin" of the American Indian; and even the Australian's dark skin shows, on careful examination, various shades of crimson and purple. The ancient Egyptians seem to have had lighter shades of the same colours. In darker-coloured races, such as the Africans and Melanesians, there is a good deal of pigment in the cutis also. When the pigment is confined to the epidermis, the cutis is quite light, and, when the epidermis of the dead body decays, the whole body becomes of a lighter shade; which explains how the Australians came to think that Europeans were their dead come back to life.

Without entering upon the very difficult problem of the colours of the various races—the colours of different parts of the body we cannot discuss at all here—we must try at least to show the connection of the various types as far as it is possible in the present state of our

knowledge. To begin at the beginning, let us say that the colouring of the body in man and the animals are very different matters. As long as man's ancestors had, as the apes have, a thick coat of hair, the colour of the skin under the hair had very little to do with their appearance. In the lightly haired parts of the bodies of apes and monkeys (face, etc.) there is a conspicuous colour, sometimes dark, at other times quite vivid. These facts suggest that the factors regulating the colour were different in the face and in other parts of the body when the hair on the trunk and limbs began to decay.

Why the hair was lost we, as I said, do not know. The process varied a good deal owing to local circumstances, and the monkeys have retained the hairy coat. If there is any clue to the human variations to be found in the monkey world, it is the occurrence of lighter and darker shades. From this point of view the appearance of a light variation is important. The coat of the orang is conspicuous for its yellowish red colour, and in the hair of the head it reminds us of Europeans. It has been noticed that the hair, which is dark in the adult, is often quite light in early years. Moreover, before sexual maturity is reached, the entire body is covered with a fine coat of hair of, at first, a light, golden shade. It becomes darker afterwards. The same thing is found amongst the Papuans of New Guinea, some of the Melanesians, and the African pygmies.

These facts give us a certain amount of material that we may use in trying to settle whether the original colour of the body was dark or light or intermediate. It was probably the latter. The skin underneath the coat of hair had no uniform colour. If it acquired one after the loss of the hair, the process must have been very gradual, and a general dark colour would be the last stage. For this reason we may see in the gradual darkening of an originally light body, in the case of the Australians and other dark races, a repetition of an ancestral process.

Why the shades of darkness become so different in different races, we do not know. Until a short time ago it was usual to attribute the colouring of the skin to direct climatic influences. The fierce sun of the tropics was supposed to have made men brown or black. But the distribution of the coloured races prevents us from adopting this very simple solution of the problem. There is much the same colour all over the American continent in spite of the enormously different conditions in different latitudes. In Australia the distance from the equator makes no difference to the colour. The extinct Tasmanians are said to have been particularly dark, though they lived in the most temperate region of all (Fig. 104). Even in Africa there is no rule in this respect. It must be admitted that probably other factors besides solar radiation are responsible for the colour of the skin.

In this connection we have in recent years found a new possible clue in the action of the ultra-violet rays. An accumulation of pigment in the skin affords a very good protection against these rays, which are otherwise very injurious to Europeans. Without this pigment even the savage would not be able to go naked with impunity. But this sort of "browning" does not depend on the glow of the sun; it is particularly strong on snow-covered surfaces. A moderate darkening of the skin, however, gives sufficient protection against it, and the deeper shade may, therefore, be due to other causes.

Possibly we should—on the analogy of the protective colouring of animals—think rather of a different kind of protection: the possibility that the dark shade of his skin was a means of concealing the prehistoric hunter ("camouflaging" him) as he stalked his prey. The dark red shade of the Australian aborigines changes a good deal with the light. In bright sunlight the skin differs very little from the brownish earth; in the dark the dark body is quite invisible. It is said that the Tasmanians, in their war against the white colonists,

often escaped by imitating tree-stumps in the bush by remaining quite motionless.

It is equally difficult to say how the European acquired his white skin. Up to the present, in fact, there has been no attempt to solve the problem, though it is of the greatest interest. Perhaps the sight of it is too familiar to us for the question of its origin to occur to us, and therefore no one has tried to answer it. We are still uncertain what was the common primitive condition



FIG. 104. —THE TASMANIAN. (GERVAIS.)

of the light and dark races ; and even if we assume that it was an intermediate shade, we imply that there has been a loss of pigment in the European.

When we seek phenomena that might give us some explanation of this, we naturally think of the conditions of life during the Ice Age and wonder if the absence of strong sunlight during a prolonged period might not have brought about the light skin. We are reminded of the lack of pigment in animals that live in grottoes underground. In the absence of any better explanation we may ascribe some influence to the long period during

which the Europeans of the Ice Age lived in caverns. But it is not a satisfactory solution. Snow-fields lit by the sun really encourage the development of pigment as protection against the ultra-violet rays, as the experience of "sunburn" on glaciers proves. Robert L. Bowles has shown that this not only permanently darkens the skin—a fact we see also in the dark-skinned Eskimo—but it can even give a dark colour to wood. Can we suppose that a foggy and gloomy climate is responsible for the reduction of the pigment in the skin? Perhaps there were several causes at work, including the sexual selection in which the whiteness of the woman's body played the part of stimulus.

The most remarkable feature of this loss of colouring matter is the way in which it promotes the development of the mental faculties. One thinks instinctively of a sort of compensation, giving new advantages as the result of a loss. Certainly it is unquestionable that the loss of pigment has had that effect. Plenty of pigment is a protection, not only against the sun's rays, but against the germs of disease. Amongst the mammals, varieties that are rich in pigment are often better equipped to resist toxins than lighter varieties.

Even in regard to the eyes the impoverishment of the pigment, which turns a brown iris into a pretty blue, has not been without significance. The exceptional liability of Europeans to have maladies of the eyes may be a consequence of this.

The various stages of the process of degeneration of the colour of the skin, hair, and eyes are preserved in the different types of blondes and brunettes that we have in Europe to-day. Where the blonde Teutonic type was developed we are not yet able to say. We can only use the bony structure as our guide if we would pass from the races of the Ice Age to those of modern times; what the colour of the skin of the former was we do not know.

Our next step is to follow further the fate of these two races of the Ice Age, which we find as sharply separated from each other as two species of animals. We have already said that there was a struggle between them, but eventually there must have been a mixture of the races. We have good reason to suppose that this mingling went so far during the Ice Age as to give rise to new races ; and some of these which are known to us are of extraordinary interest.

CHAPTER XV

THE DAWN OF ART

THE new race which comes upon the scene after the fusion of the Neanderthal and Aurignacian races is known as the Cro Magnon race. The first relics of it were found in 1868, in the Vézère valley, by Lartet and Christy. The cultural layer to which they belong is open to several different interpretations, but it probably corresponds to the Aurignacian or the Magdalenian stage.

The skeletons of this third type of fossil man in Europe are remarkable for their size; a common result of the mingling of different elements. The Cro Magnon men must have attained a height of six feet six inches, and even more. The limb-bones combine the robust development of the Neanderthal race with the finer skeletal structure of the Aurignacian. The skull has the great breadth of the Neanderthal, the fine dome and height of the Aurignacian, and the length that is common to both. The skeleton of the face approaches the Aurignac type; but in the jutting out of the chin it surpasses both races and approaches the modern type.

Skeletons of just the same type have been found near Mentone (at Ventimiglia), in the caverns of Baoussé-Roussé; famous Paleolithic sites which have been carefully explored since 1895 under the patronage of the Prince of Monaco. They have yielded unquestionable interments of Cro Magnon men.

Probably we have a second mixed type in a skeleton of the Magdalenian period which was found in 1888 near

Perigueux, in the Dordogne. It is now preserved in the small, but valuable, museum of that place, and is known, from the place of discovery, as the Chancelade skeleton. Here again the body had been ceremoniously buried; and there is clear evidence that it had been tied up with reindeer sinews or something of that kind. The similarity of the posture to that of the Australian mummy which I brought back from north Queensland is striking. The skeleton differs from that of the Cro Magnon race in



FIG. 105. THE CHANCELADE SKULL. (TESTUT.)

having thicker limbs, more like those of Neanderthal man. The face is longer than that of Cro Magnon man, and the eye-orbits are larger and rounder (Fig. 105). It was a type of man with larger head and shorter stature than the Cro Magnon race had.

In 1910 Hauser found in the Aurignacian at La Rochette (Vézère valley) the limbs of another skeleton. They were of the Chancelade type. Hauser and I looked in vain for the skull. The remains had clearly not been

buried, and they had consequently been devoured by carnivores (probably hyenas), as the bones still showed the marks of the teeth. The remains are too scanty to permit us to speak of a Chancelade race, and the man who studied the Chancelade skeleton, Testut, of Lyons (1889), found a number of similarities to the Eskimo. This is true also of their culture. These reindeer stations of the Dordogne have yielded a great abundance of bone artefacts, and in their artistic finish and, to some extent, in their form they remind us strongly of the productions of the Eskimo.

In February 1914 two nearly complete skeletons of the Magdalenian period were found in a quarry at Obercassel, not far from Bonn. They had unquestionably been buried, and they lay, covered with large slabs of basalt, not much more than a yard from each other, in a deposit that had been (artificially) coloured red. With them were a very finely polished stone polisher, with an animal's head engraved on the handle, and a carving of a horse's head: typical products of Magdalenian art, and the geological characters corresponded to that period. The strewing of the bodies with red iron-stone points to the same period, as the finds at Mentone and Brunn indicate. The bodies were said to be those of a graceful young woman of about twenty, a little over five feet in height, and a man of from forty to fifty, with extraordinarily powerful limbs and a height of about five feet four inches.

The woman's skull was finely rounded, and the back part of the head well developed. The forehead was broad, with rather large frontal ridges for a woman, and the chin was well formed. The man's skull was very broad and low, and looked brutal in comparison with the woman's. The forehead was narrow and rather sloping; the cheek-bones remarkably large; the lower jaw powerful, and like a V with a blunt angle. The differences between the two are differences of sex, not race;

and the various features, showing points of contact with the Neanderthal as well as the Cro-Magnon race, are such as commonly result from a mingling of races.¹

Certain discoveries at Predmost next demand our attention, and they are so important that we may describe them at length. Next to France, this is the chief Paleolithic centre in Europe, and it has yielded several complete skeletons and immense quantities of artefacts and fossil bones of animals. The details have not yet been published, but the following brief account ² may be given here.

Near the village of Predmost, in north Moravia, is a little hill on which was found a very extensive prehistoric site. Bones had previously been found at this spot, but it was not until 1879-86 that a series of systematic explorations disclosed the importance of the site. Further excavations were made in 1890-4, and in 1895-6 an immense quantity of material was gathered. The animal bones included all the usual types of the middle part of the Ice Age: the mammoth, arctic fox, wolf, reindeer, horse, arctic hare, bear, lion, rhinoceros, elk, beaver, lemming, hyena, etc. The mammoth bones were extraordinarily abundant, the collection including no less than 2,000 well-preserved molars of animals of all ages, from the foetus onward. It is calculated that the deposit contained the remains of a thousand mammoths, and that they were all victims, not of an epidemic, but of the Paleolithic hunter. The bones were partly sorted out according to their types.

It is very probable that the limestone cliff which is at the summit of the hill formed a hollowed-out shelter, and was on that account chosen for a settlement that lasted many generations. There are many small fire-places, in artificially made hollows, with implements and bones lying about them; and there were much larger

¹ The complete study of the Obercassel remains has now been published and confirms this (*Der diluviale Menschenfund von Obercassel*, 1919).

² Supplied by Dr. Absolon, of the Brünn Museum, to Dr. Heilborn.

fire-sites, with great heaps of mammoth bones and stone implements, which seem to have been the chief centres of industry. Then there were "rubbish heaps," and these have yielded very rich material.

Various human bones were found, and at last, in 1894, Maska found a cemetery with the remains of about twenty individuals, of all ages. A child's body had its ornaments on, and heads of arctic foxes lay beside others. Though the full report is not yet published, it is certain

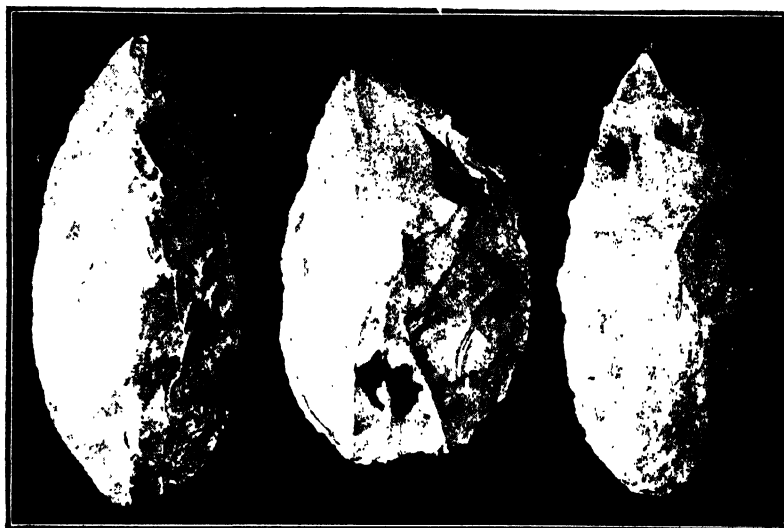


FIG. 106.-PREDMOST IMPLEMENTS. (ABSOLON.)

that there were the bodies (highly fossilised) of eight adult and twelve youthful members of a new race of the later Palcolithic—the *Homo Predmostensis*, a mixed type, probably due to the crossing of the Neanderthal with the Aurignac or some other. A number of the skulls and skeletons have been reconstructed, and the photograph shows that there was an unmistakable affinity to Neanderthal man. It is to be noted, however, that it is only the male skulls at Predmost which show characters that are common to both sexes in the Neanderthal

race. In the chin and femora and other features, nevertheless, the Predmost men differ entirely from the Neanderthal, and agree with other late Paleolithic races.

Something like 40,000 stone artefacts—flint, quartz, jasper, limestone, sandstone, and obsidian—were collected.



FIG. 107. MALE SKULL FROM PREDMOST.

They were mainly microliths, knives, daggers, borers, toothed daggers, axes, lance-heads, arrow-heads, scrapers, etc. (Fig. 107). More than a dozen “laurel-leaf points” of Solutrean design were found, and the majority of the experts assign the settlement to the Solutrean period.

Many of the implements, however, show Aurignacian retouches, and the question of date is not yet settled. The culture is mixed like the race, and seems to be on the frontier between the two periods.

Large numbers of objects (needles, awls, flat clubs, spoons, slings, smoothers, hooks, etc.) of bone and ivory and reindeer horn were found. Daggers were made from the bones of lions and bears, the joint being used as a handle, much as one finds in Papua. Fossil ivory was used for daggers, real assegaïs, awls, points for missiles, etc. Characteristic of Predmost are cylindrical smooth bodies, some with an eye or a handle at one end, made out of teeth, which were split vertically and then polished. They may have been used as missiles for slings. There are large numbers of real table utensils such as spoons. Other objects (forks, etc.) are not easily understood, but Dr. Heilborn connects them rather with ceremonial implements, like the forks for human flesh in Fiji. The prongs are cleverly made of ivory, and the body out of a mammoth's tooth.

Predmost man was clearly an advanced artist. He decorated many of his implements with lines, dots, and incisions, and even used bones to embellish his weapons with drawings, zig-zag lines, etc., grouped into ornamental designs. He drew on mammoth ribs, reindeer, horn, and slate, and made cylindrical, conical, and pyramidal objects and weapons of ivory. There is, for instance, a ten-inch rib-bone, used as a polisher, which has on it 2,000 lines in a sort of herring-bone pattern. One small richly decorated object, with a head for carrying it, may have been an amulet. It reminds us strongly of the ceremonial sticks and stones of the Australians.

There is a fragment of a mammoth's tooth with a very curious engraving on it, which seems to be a fantastic representation of a man in geometrical form; apparently a nude, but richly tattooed, woman's body.

The jewels of the collection are five statuettes carved

out of the bones of mammoth's feet. The head and neck, hands and breasts, are vaguely indicated, and the



FIG. 108.—MAMMOTH TUSK WITH FANCIFUL ENGRAVING OF WOMAN.
PREDMOST. (ABSOLON.)

feet omitted entirely ; but the ventral region is, as always with the prehistoric artist, greatly exaggerated. They

are probably meant for women with child : a phenomenon that must greatly have puzzled primitive man. The statuettes are very small (four to six inches) and crudely carved, and they are smooth at the basis. As they seem to represent women in a sitting posture, they may have been so placed at festivals. They seem to have been either idols or amulets. Bartels has described certain sitting figures, crudely worked, very like the Predmost figures, which some of the Siberian peoples make as prophylactics against pains in the chest. The Predmost remains also include unfinished statuettes, so that we can gather the method of carving. These naked Predmost women are on a level with similar statuettes from Mentone, the Brassempouy and Willendorf "Venuses" (Fig. 52).

Finally, there is the famous "mammoth statuette," carved out of a piece of ivory, five inches in length, and about an inch and a half in height and thickness. It is almost faultless, only injured a little in the head and tail; and it agrees very well with the mammoth drawings on the walls of the caverns at Combarelles and Font de Gaume. The surface is polished, or covered with lines of various kinds to show where the mammoth was bald and the different growths of hair. The figure is not only very valuable as a realistic representation of the mammoth, with which Predmost man must have been very familiar, but is one of the oldest specimens of plastic art and a remarkably good piece of work.

The limestone cliff has, unfortunately, long since disappeared, or it might have given us wall-paintings like those of southern France. In any case, we are astonished to find such good realistic work (the mammoth) alongside of purely idealist work in the middle of the Palcolithic. We find art here developed long before the Magdalenian period. The mammoth-hunters also used a number of varieties of shells for personal decoration, as well as pebbles, slate, bones and other objects; much the same as we find in the Vézère valley. A unique find

was fourteen ivory beads, cut like pearls, which had formed the necklace of a dead child. Another interesting object was a couple of canine teeth of a young wolf, connected at the roots, which reminds us of nose-ornaments worn in Papua. Colouring stuffs, such as red chalk and ochre, were scattered about the fire-places.

The Predmost finds throw a wonderful light into the gloom of the past. We see a new race, with far higher gifts, yet in the features of the skull recalling its crude ancestors, coming upon the scene as the two older races blend. Artistically it was, no doubt, influenced by the Aurignacian strain of its ancestry. From its cliff-shelter the race must have looked out over a vast tundra, with great marshes and forests, with herds of mammoths and the other animals whose bones we find. To the cliff, where they were safe from floods and sheltered from the raw winds, the hunters brought the bodies of the great pachyderms they had trapped or slain. They were powerful men, above middle height, more intelligent than many savages of to-day. Apparently they tattooed and painted their bodies, and clothed themselves in the furs of the dead animals. They buried their dead with respect, and heralded the dawn of art. At last a new period of intense cold, and possibly the reduction of the game in the region, drove them from their shelter, and we know not what became of them. Their limestone cliff was quarried long ago, and the very site of their settlement disappeared from view.

Not far from Predmost, at Ondratitz, there is another Solutrean settlement, which is hardly less rich in artefacts, but has not yet been methodically explored. Other bones found at Happurg (not far from Nürnberg)—a fragment of a skull-cap, a well-preserved lower jaw, and a few other bones—seem to belong to a mixed race. The skull seems to combine the Neanderthal and Aurignac characters, especially the former, and the jaw combines the features of all the previous races in a remarkable

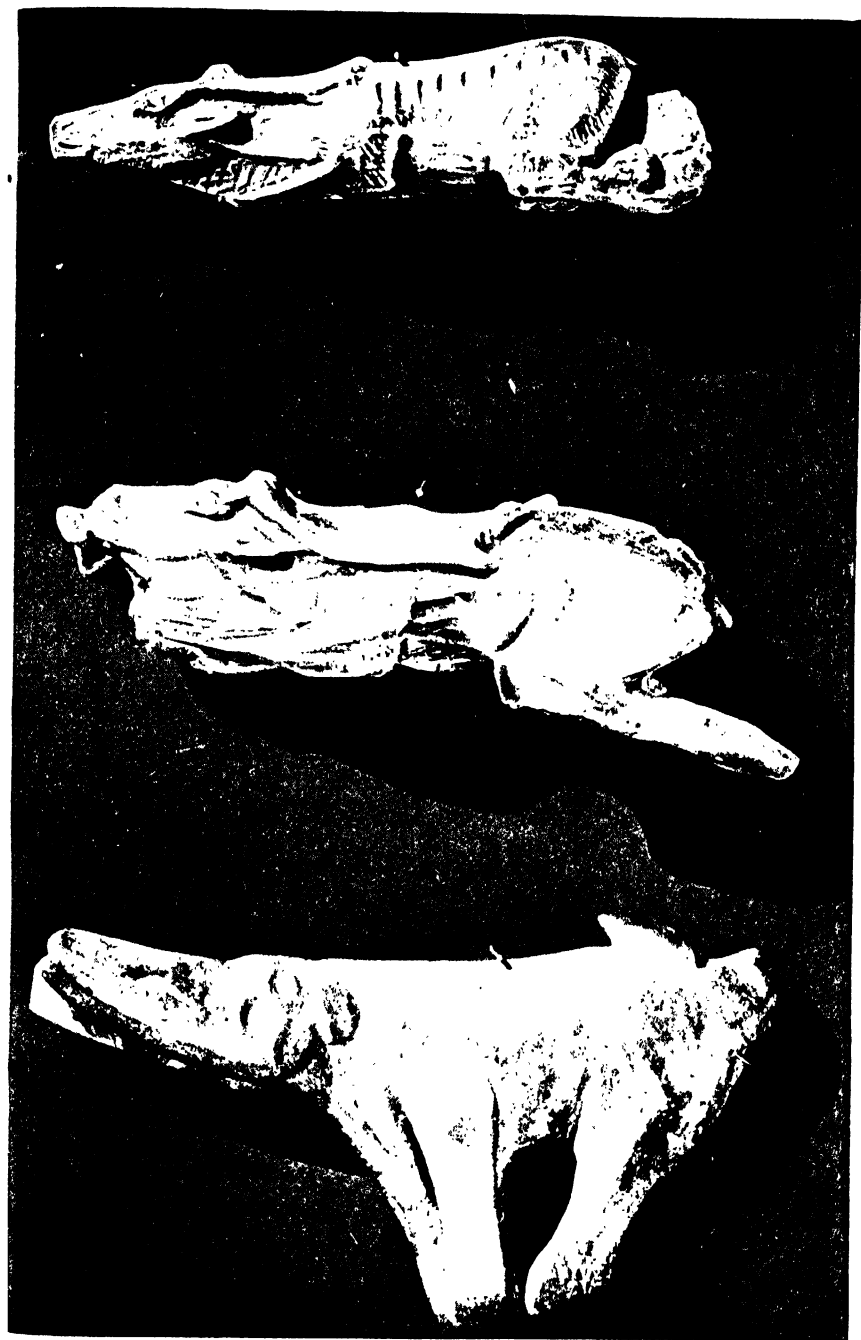


FIG. 109.—CARVINGS OF THE MAGDALENIAN PERIOD

manner. Elsner, who has studied the remains, says that it was a mixed race, closely approaching the Cro Magnon. Lustig and Klaatsch also concluded that the race was of a mixed type. Hauser has since shown that the culture associated with the bones is Micoquian, not partly Mousterian and partly Aurignacian, as Klaatsch and other investigators had concluded.

Although we are not yet in a position to prove it, we have every reason to regard these mixed races of the later Ice Age as the makers of the works of art that we have now recovered in such abundance. First we found outline drawings on bone and reindeer horn in the sixties of the last century, and they were remarkable enough for the firmness of line and keenness of observation. Then carvings came to light; in fact, there is reason to think that sculpture is older than painting. At last we found coloured representations on rocks, or sometimes combinations of these with the natural inequalities of the rocks. The first were discovered in a grotto at Altamira in the north of Spain, and were received with learned incredulity. It was not until sixteen years afterwards, when further discoveries were made in the grottos of southern France, that the experts were forced to accept them.

One of these caves, known as "Les Combarelles" (Dordogne, 1902) has incised drawings without colour. The animals represented, the mammoth, reindeer, antelope, horse, etc., must have lived at the time. Another cave not far away, Font de Gaume (Dordogne, 1902), has coloured drawings and shoulders of rock shaped into animal forms. The chief animals represented here are the reindeer and the bison. It is, clearly, a later stage, with more skilful art. We now have no less than forty of these painted caverns, all in the south of France or Spain. And when we reflect how casually they were discovered, and how little exploration has been done in the south of Europe, we may expect to find many more.

In looking for the source of this artistic life, we naturally turn to the Australian aboriginals. In spite of their backward condition, they have a well-developed feeling for the beautiful, as is shown by the artistic finish of their weapons. They are also very fond of engraving on rocks, bones, trees, and other objects. On the plateau of limestone rock in South Australia we find life-size representations of men and animals, whales of gigantic length, scenes from the life of the natives, weapons, footprints, and symbolical designs.

We find the same in West Australia. In fact, rock-paintings (generally with red and white earth) are found all over the continent. And the resemblance of the methods of the Paleolithic artist to those of the Australian is quite astonishing. At Altamira, for instance, there are a number of coloured hands; and in Australia the natives leave a memorial of a visit by painting a hand on the rock. The hand is laid on the rock, and powdered colour is taken in the mouth and squirted over the hand, leaving an outline of it on the rock. It is not impossible that the Australoid branch of the Paleolithic humanity of Europe took the artistic capacity with it.

The Bushmen of South Africa also do artistic work similar to that of the European Ice Age. Their ancestors were the authors of rock-engravings and cave-paintings which, in their vivid representation of hunting scenes, are not unlike the work of the Australians and Paleolithic man. The Bushmen are not negroes, and we do not know how they are related to the common root of the human family. We must not assume that their art has any connection with the others, and it is therefore clear that there were more independent developments of art. There is, as far as our knowledge goes, no physical point of contact between the Bushmen and the Paleolithic races, and so we assume none for their art. Rock-paintings have been found in many parts of Africa where they were quite unknown to the present black inhabitants. We

know that the Bushmen represent an earlier stratum of the population of Africa, and it may be this that is responsible for the rock-paintings.

As to the origin of the artistic impulse we can give no satisfactory explanation. Much has been written about the psychology of art in recent times. A possible connection with religious or magical ideas has been discussed, and the painted grottos have almost been represented as "Paleolithic churches." But we have as yet no firm ground for forming an opinion on these matters.

It has also been attempted to draw a sharp distinction between the naïve and naturalistic representation of animals and the symbolical alteration of their forms. Verworn, the ablest writer on the subject, has called the former "physioplasmic," and the latter "ideoplasmic" art. I can, however, not quite agree with this high authority, as in Australia I have seen too many intermediate forms between the two. But it is quite possible that some secret motive, more or less in the nature of magic, is at the bottom of this symbolical reproduction of animal figures. It does not seem to me likely, however, that we must attribute the beginning of the drawing of animals generally to magic connected with hunting. The naïve joy of the savage, filling the whole soul of the primitive hunter, was projected outwards in these artistic beginnings.¹

Very important consequences followed from man's development of artistic impulses. The most astonishing is the fact that the artistic faculty decayed when the Ice Age was over in Europe. It is only here and there, far away from France, and at a later period, that we meet rock-drawings of the old character. When we apply

¹ In some of the more recently explored caves, the drawings of animals were so placed that most authorities now think they were done for the purpose of "sympathetic magic": as a sort of charm to bring more of such animals within range of the hunters. There are also mysterious marks painted on pebbles which some attribute to magic. [J. M.]

this test to the Neolithic population of Norway and Sweden, it seems to show that they were the descendants of the Cro Magnon race, who may have migrated to the exposed lands in the north after the final retreat of the glaciers. This is confirmed by the vast numbers of Neolithic implements which we find in Scandinavia. Any man who has seen these, and appreciated their remarkable

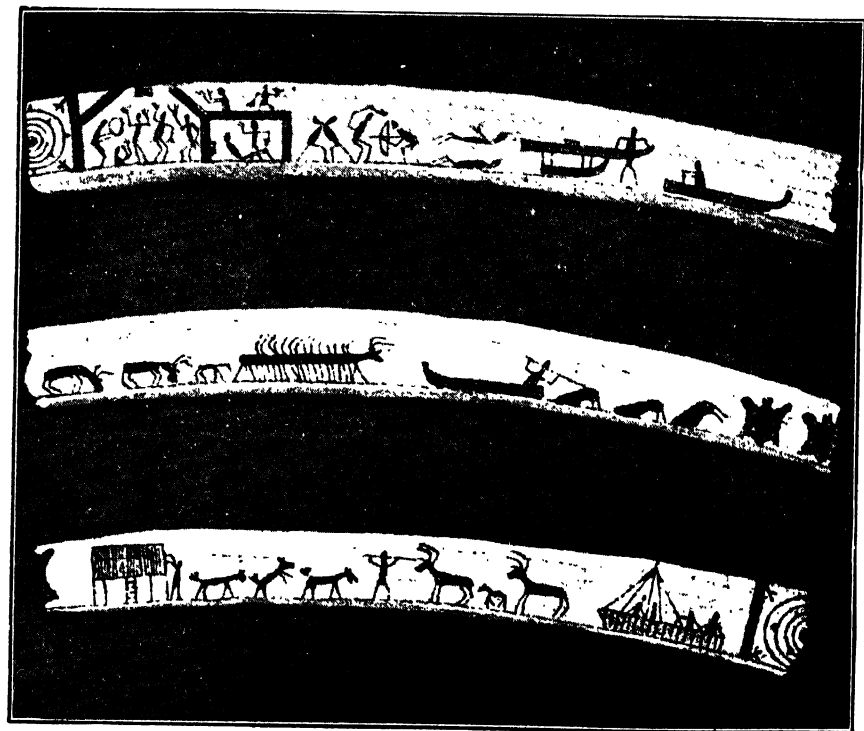


FIG. 110.—ESKIMO DRAWINGS. (HEILBORN.)

workmanship, in the Copenhagen Museum, will be disposed to see in them a further development of the French Solutrean and Magdalenian culture.

A further important consequence is in the relation of Paleolithic art to the development of written language and the writing of history. Even the representations of events on the Australian rocks are historical monuments; as are also the Bushman inscriptions, and the

drawings on bone of the Eskimo. In these the artistic representation of the individual figures is a secondary matter, and separate objects are often indicated by a few lines. It is only one step further to pass from painting to picture-writing, to the Egyptian hieroglyphics. The wall-paintings of the Egyptians are typical conventionalised continuations of the rock-paintings of the Old Stone Age. There are many designs amongst the latter that we do not clearly understand. They are symbols, such as we have later in the shape of runic characters, letters, etc : one of the sources of the written alphabet.

But artistic representations proper decrease so much in number and excellence after the Ice Age that we can by no means speak of a general progress of Europe at that time. Indeed, we are disposed to see a sort of atavism in the artistic powers displayed by individuals in later ages. Hence the fittingness of the phrase, that "the artist is born, not made." Hereditary forces have passed on to him a capacity which no amount of individual effort would have developed.

The retreat of the glaciers to the summit of the Alps and to the north put an end to the rule of the hunters of the Old Stone Age. They are themselves partly to blame, as they destroyed the greater part of the animal world. The rest of the animals followed the retreating glaciers to the Alps (the chamois) and to the north, where the Laplanders, descendants of the men of the Ice Age, live to-day with the reindeer, as their fathers once did in the heart of Europe.

The reduction of the animal population would be the chief cause of the development of cattle-rearing and agriculture. We do not as yet know where they began, or by what race they were introduced ; and the same may be said of most of the other advances during this period of transition. The great mass of facts will have to be carefully sifted, as we learn them from the vast remains of the New Stone Age. A considerable knowledge is

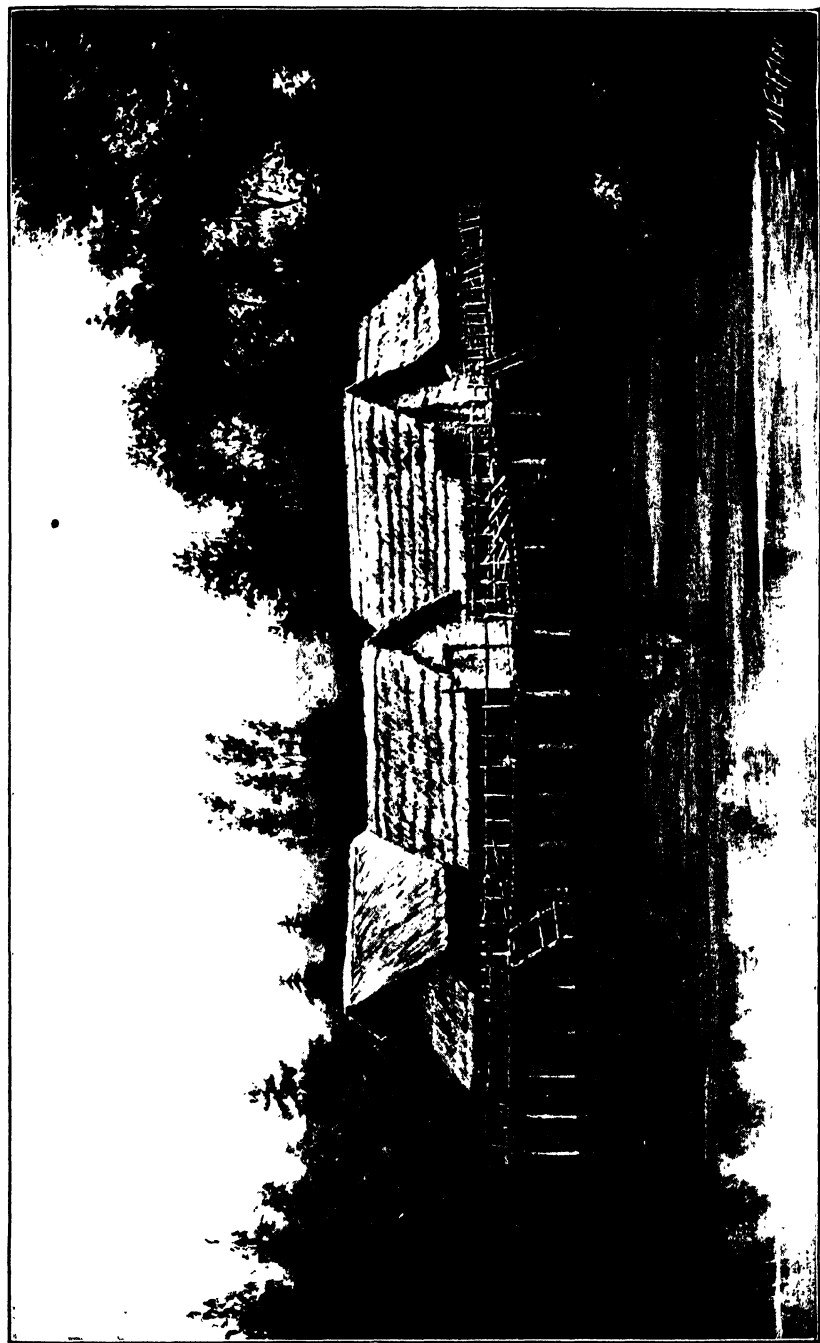


FIG. III.—A PILE-VILLAGE OF THE NEW STONE AGE. (EIFFLER.)

required to be an expert on the pottery alone, with all its variations of form and of external ornamentation. Then there are the pile-dwellings of the Swiss lakes. They open up to us a new world, with their villages built over the water, their cattle and agriculture; an idyllic world compared with the raw conditions and cave-life of the Paleolithic hunters.

But there is Philistinism even here; no trace of an advancing imagination. The great stone monuments that were raised to the northern heroes, are in happy contrast. These "megalithic" men must have had larger minds and imaginations.

But the problem of the division of races in Neolithic Europe is still too obscure to be discussed here. In spite of Schütz's efforts to connect different levels of culture with different races, we are still very uncertain. We may, however, at least say that there has been a much more continuous development in central Europe, from the Ice Age to the present, than was formerly supposed. The earlier opinion was that the primitive population was extinguished, and the gap was filled by new immigrants. On the contrary, we have every reason to see in our fellows to-day a continuation of the races of the Ice Age. A large part of the Teutonic peoples are related to the Aurignac or the Cro Magnon race.

The task of the immediate future is to find the connection between the "historical" nations of the few thousand years before Christ with the prehistoric races which still lived in the north. Valuable work has been done in this respect; but an enormous amount is still to be done. The limits of this work do not permit me to go on to the historical period. My aim was to discover the early stages of man's achievements, and thus provide a foundation on which we may, by the aid of historical methods, construct a complete account of the evolution of humanity.

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